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Owned and Published by

CHILTON COMPANY
(Incorporated)

Publication Office
Chestnut and 56th Sts.,
Philadelphia, Pa.

Editorial and Executive Offices
239 West 39th St.,
New York, N. Y.

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Member, Audit Bureau of Circulations
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Indexed in the Industrial Arts Index.
Published every Thursday. Subscription Price: United States and Possessions, Mexico, Cuba, $6.00; Canada, $8.50; Foreign, $12.00 a year. Single copy, 25 cents. Cable Address, "Ironage, N. Y."

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THE IRON AGE

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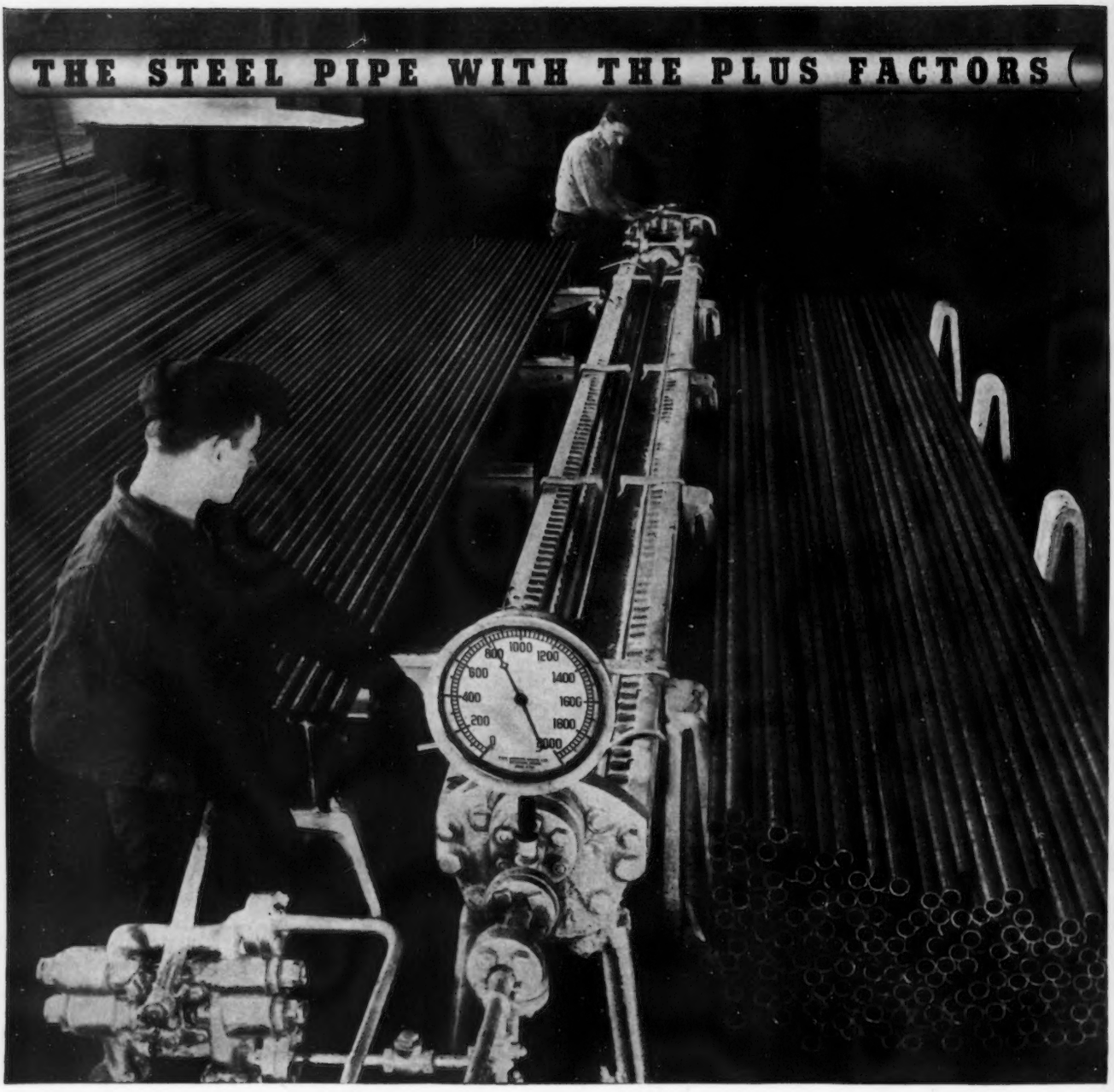

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MAY 5, 1938

ESTABLISHED 1855 Vol. 141, No. 18

The Other Side of the Moon

UNTIL recently, no resident of Mother Earth had ever seen the other side of the moon. For, as you know, the moon keeps its other side in privacy, exposing only one side to the gaze of man.

In the interests of science and the advancement of knowledge, and very secretly, THE IRON AGE recently dispatched an investigator to the moon in a rocket ship. He arrived home safely last week, escaping the notice of the newspapers and so we can be the first to reveal what he discovered.

Equipped with the necessary supply of oxygen for breathing and with lead foot weights, our representative, after days of arduous toil, climbing over the moon mountains and canals, made his way to the other side. This he found to be entirely different from what had been expected.

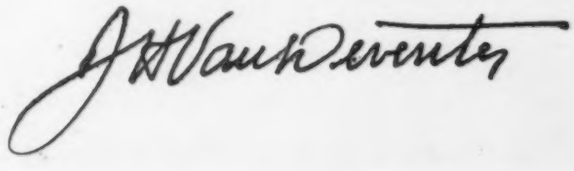
The other side of the moon was not dry and arid, as is our side of it but is similar in climate to northern Arizona, although of course with a much more highly rarefied atmosphere. And it is inhabited. The people who live on the other side of the moon are called Luna-tics, a term derived from the Luna—the moon. These people are ruled by an elected dictator known as the Chief Luna-tic. It is his task, aided by a coterie of assistant Luna-tics, to manage the system of planned economy which the Luna-tics have adopted.

The requirements of the Luna-tics are much simpler than those of us Earth people. They secure nourishment chiefly from a liquid known as "tiderc," which is a rather sweet mixture compounded under government supervision and pumped to all parts of the country by means of a complicated system of pipe lines and reservoirs.

At the time of our observer's visit, the Luna-tics were not doing so well. Their appetites had failed perceptibly and they were not using up the normal amount of tiderc. As a result, the supplementary storage tanks throughout the land were full of it.

An investigation by our representative revealed that the Luna-tics were suffering from an unbalanced diet, consisting of too much tiderc and too little krow-ot-egru, which was the food that had made their ancestors thrive in the days before planned economy. Yet strangely enough, on visiting the capital of Luna, he found the Chief Luna-tic preparing to speed up the tiderc pumps and force billions of gallons more of it through the system in the hopes of making the Luna-tics recover through forcible feeding.

The moral of this story may be found, perhaps, by spelling "tiderc" and "krow-ot-egru" backwards.



Stainless

By T. W. LIPPERT
Metallurgical Editor, The Iron Age

o o o

ON a 24 per cent production increase, sift some potent metallurgical developments, garnish with an uneasy patent situation, bake well in the intense heat of competition, and season with just a pinch of price discord—such was the recipe for stainless steel in the year 1937.

o o o

TO be sure, 1937 was a Janus-faced twelve months for all steel producers, but now the record shows that the diminutive stainless steel industry emerged from the year-end economic wreakage proportionally a couple of jumps ahead of the makers of plain steel. Both, of course, assot with boom psychology, went through that heady sellers' market early in the year, when only personal pull could spring loose a delivery in less than two months; and both were blasted by that subsequent hurricane as buyers madly dashed from mill offices. But stainless mills bucked the exodus at the outset more successfully than plain steel producers, the result being the former wound up 1937 with 24 per cent more tonnage than in the preceding year, whereas the latter, for all its mammoth new mills and bright prospects, ended up little better than 5 per cent over 1936. But, recession is a grim leveler, and both stainless and plain steel makers are today in about the same boat—awash at the gunnels—and seemingly only a good stiff jolt of Federal spending will salvage much of 1938 for either.

Scanned from the jejune market of today, 1937's 24 per cent increase and new high level for stainless steel production is most encouraging, being particularly informative when broken down into products and analyses, as herein it is. But, an industry thrives not by virtue of production alone; so, to set a proper backdrop for last year's significant statistics, this discourse will dissect the production data and examine consumptive outlets, consider price shifts in raw and finished products, sketch a few possible competitive developments, glance over patent ramifications, list several additions to the farrago of stainless analyses, pick up some odd-analysis cutlery in a tiny Olvera Street shop in Los Angeles, jump to England to pour a 10 per cent copper-stainless heat, then on to Germany to examine the increasingly popular chromium-manganese steels, and, while in that country, visit a mathematician building and rebuilding a cluster mill, finally to return to Watervliet, N. Y., to consider a clever gesture toward the mass consumption markets. This complex agglomerate of related events is most pertinent to the stainless steel industry of today and tomorrow; and, dealing with the events seriatim, the following paragraphs will first review THE IRON AGE's ninth annual production survey, the only production record of this type available to the trade.

Reactions to requests for detailed breakdowns of 1937 stainless production figures exemplified again the sensitiveness of this industry which is not long out of its swaddling clout. One large producer, which had sent carefully correlated data in all previous years, declined to do so in the current survey. On the other hand, two smaller producers volunteered shipment figures for 1937 and previous years, although never before had information been released. Other mills, both primary and secondary, sent their data and adequate correction made for inter-company shipments of ingots, slabs, wire rods, etc. Thus, with proper weighting of the one absentee's previous records, the accumulation of 1937 production information tabulated in Tables I and II is believed to be accurate to within plus or minus comparatively few tons.

A glance at Table I shows a 1937 stainless ingot output of 126,842 net tons, a 24 per cent increase over 1936. Table II lists the conversion of these ingots into 75,851 tons of finished steel, perhaps not a particularly impressive figure unless expressed in a dollar value of, say, $60,000,000. What this sizable aggregate $60,000,000 gross figure might net on the balance sheet is of course problematical, but the persistent hazards so typical of stainless manufacture, together with a pretty two-fisted competitive scramble for business over the latter half of 1937, would indicate profits spread fairly thin at more than one plant.

A most significant 1937 development marketwise was the demise of Chemical Foundation's last basic patent (No.

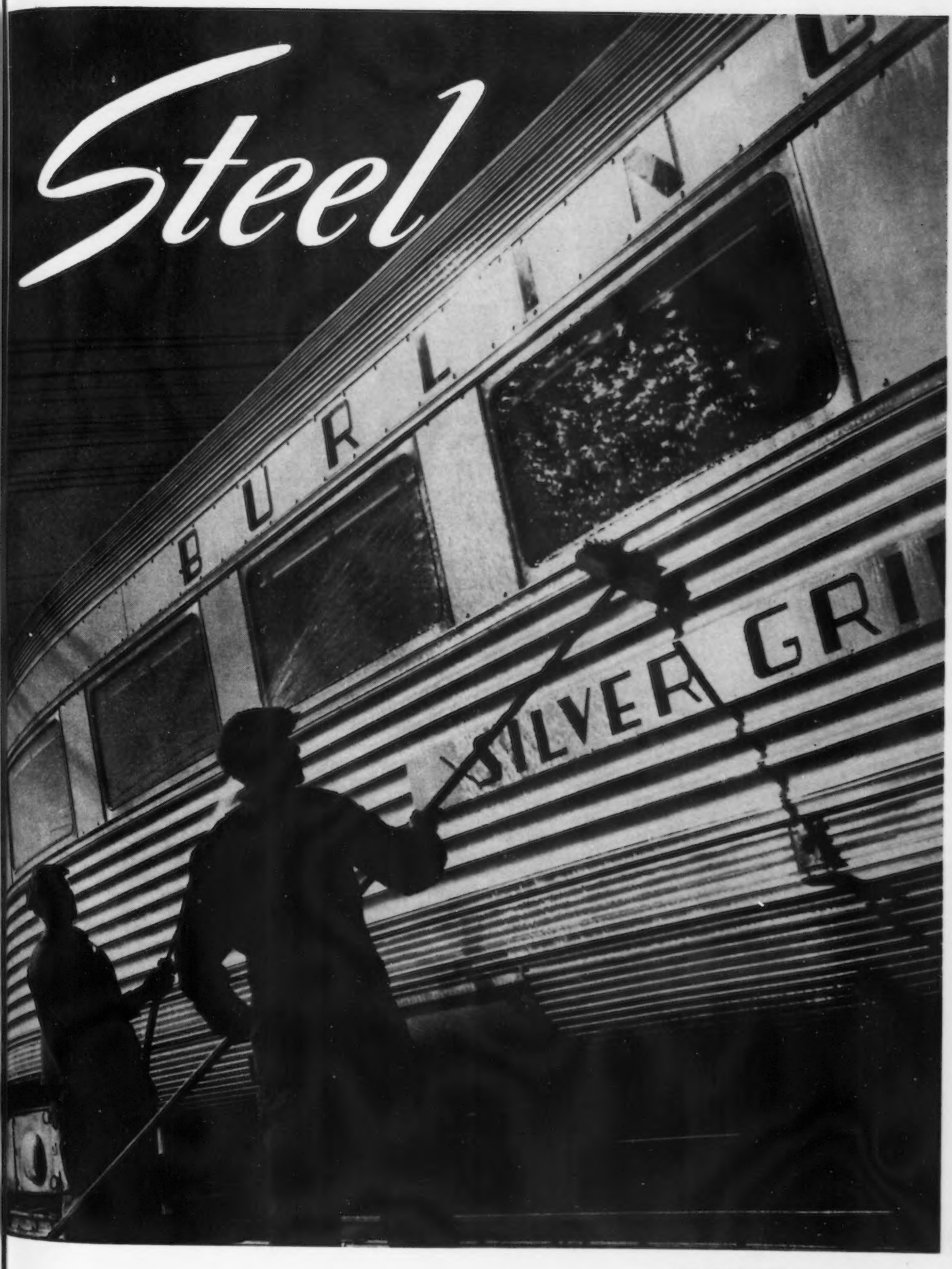

Steel
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TABLE I

Production by Analyses Groups* of Corrosion and Heat-Resisting Ingots and Castings in the United States (1929-1937)

(Net Tons)

	1929	1930	1931	1932	1933	1934	1935	1936	1937
Ingots:									
18 Cr and 8 per cent Ni	21,074	32,867	14,740	9,209	19,620	24,818	30,114	45,800	55,011
25 Cr and 12 per cent Ni	....	....	....	....	....	....	3,827	5,530	6,423
12 to 14 per cent Cr	14,552	8,821	5,397	4,900	7,401	9,470	15,220	25,430	30,186
16 to 18 per cent Cr	10,127	7,995	7,483	6,751	4,969	8,787	14,101	21,478	28,500
18 to 30 per cent Cr	....	....	....	....	....	....	1,606	1,022	1,615
All others (Cr and Cr-Ni)	2,950	4,792	3,438	3,312	5,262	8,832	6,713	2,900	5,107
Not allocated	187	474	622	660	....	....	....	....	....
Total	48,890	54,949	31,680	24,832	37,252	51,907	71,581	102,160	126,842
Castings:									
18 Cr and 8 per cent Ni	310	271	225	384	352	387	446	874	1,165
25 Cr and 12 per cent Ni	....	....	....	....	....	....	760	1,280	1,430
12 to 14 per cent Cr	18	15	29	23	36	86	113	96	108
16 to 18 per cent Cr	156	96	192	237	225	164	288	295	332
18 to 30 per cent Cr	....	....	....	....	....	....	208	186	262
All others (Cr and Cr-Ni)**	3,326	2,930	2,264	1,257	2,126	3,036	2,173	3,170	4,702
Not allocated	1,392	1,009	511	285	54	201	83	....	....
Total	5,202	4,321	3,221	2,186	2,793	3,874	4,071	5,901	7,999
GRAND TOTAL (ingots and castings)	54,092	59,270	34,901	27,018	40,045	55,781	75,652	108,061	134,841

*Analyses groups are approximate; in several classifications each element may vary as much as ±2 per cent from the range shown. In the case of *castings* a sizable percentage of the tonnage in any of the straight-chromium classifications may contain from 0 to several per cent nickel.

**This "catch-all" contains many analyses groups, but by far the three most prominent are the important heat-resisting analysis 33-36 Ni and 15-17 Cr; the popular analyses in the range 60+ Ni and 10-17 Cr; and the slightly less important analysis group 36-40 Ni and 18-20 Cr. In 1937 these three groups accounted for approximately 950, 500 and 230 tons respectively.

1,339,378), and this not because of a royalty of 0.675c. a lb. was lifted from the producers' cost sheet, but rather because the Foundation necessarily relinquished its role of policeman and price mentor. Flushed with optimism early last year the industry didn't even miss the absent price umbrella, and quotations, albeit funambulatory, actually were pushed up almost 1c. per lb. (plain steel advanced 0.275c.) to offset soaring rates for the disproportionate man-hours involved in stainless manufacture. And, thanks to the stability of the two basic alloying elements — nickel and chromium — even sharper price flutters were avoided. Nickel remains at 30c. to 32c. per lb. (depending on amount purchased), just as it has for several years, and low-carbon ferrochromium was held at 19.50c. per lb. during 1937, even though the less important (for the stainless maker) high-carbon ferrochrome climbed 1c. per lb. as a reflection of chrome ore advances totaling about $7 during the twelve months.

But there is still talk of a low-carbon ferrochromium advance, which of course would bear immediately on the stainless producer who might find it difficult to pass along to the consumer. Thus, a more detailed consideration of the ore-ferrochrome relationship seems advisable. The $7 rise in chrome ore prices resulted primarily from advancing ocean freight rates, which reached their peak last September, but have subsequently spiralled down 30 per cent. The latter decline, however, does neither the ferroalloy producer nor the stainless steel maker much good; for, during last year's mad world-wide raw material hysteria, chrome ore commitment after commitment was rushed through on the rising market, the result being an astonishing import figure of 550,000 tons during 1937, with cargoes still coming in on old orders and nobody quite knowing what the devil to do with it all. It doesn't take much pencil work to conclude that in 1937 a sizable lump of chrome ore was added to the usual three-year supply piled in this country. Of course, this is a patriotic position for a strategic material, but, unfortunately, most of the year's arrivals is carried on books at near peak prices.

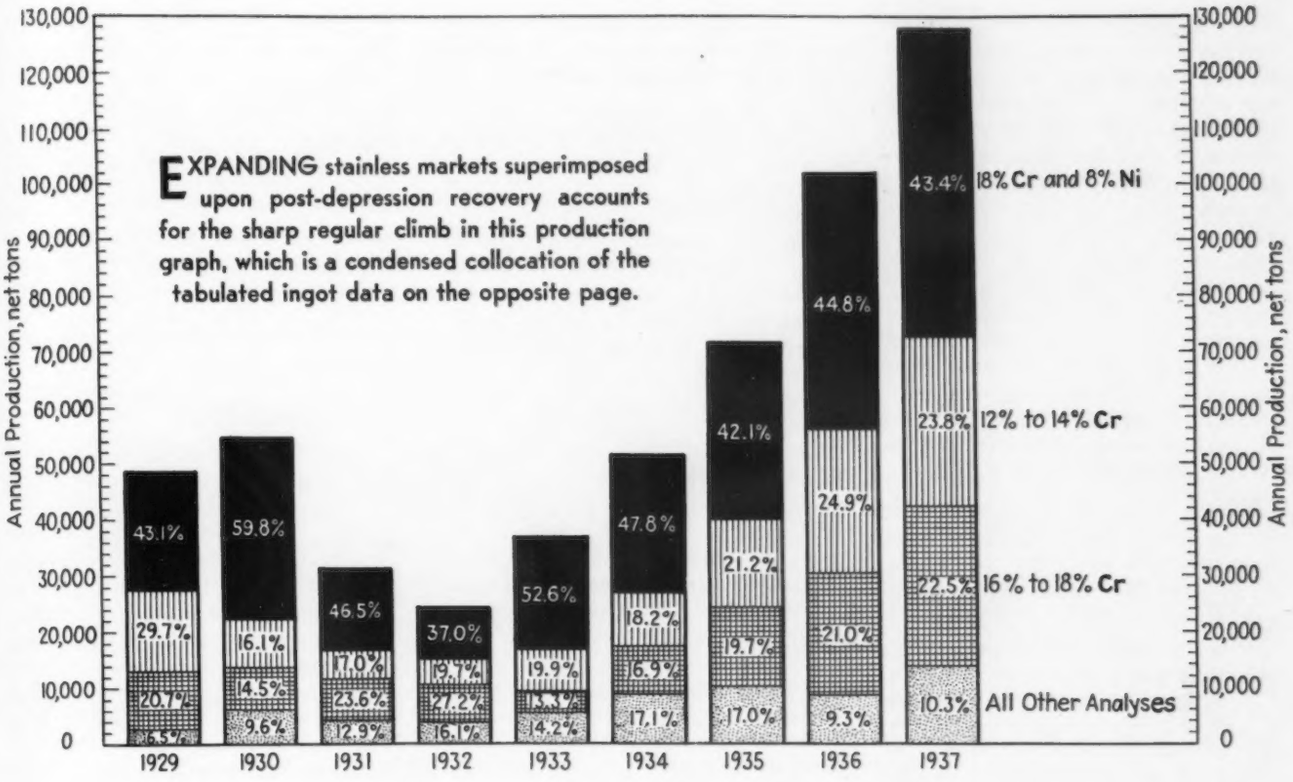
Ferroalloy producers have toyed with the temptation to average out this high investment (and storage costs) by lifting low-carbon ferrochromium quotations, but it seems that current business stagnation would discourage such action. Also, the knowledge that shrinking markets usually follows such a price rise has served to delay definite action.

Another Patent

Such attention as this to price background is a realistic recognition of constant consumer pressure for reduced quotations, which in turn would drop costs on existing stainless consumer products and facilitate further invasion into plain steel, electroplate and non-ferrous markets. Granted unchanged nickel and chromium costs, the only factors which could drag down stainless quotations would be even more drastic competition or improved production technique; conversely shifts in the basic patent situation could possibly lift prices or narrow the producers' profit margin.

Additional domestic competition is at the moment unlikely. Several large steel companies, such as National and Bethlehem, have toyed with the idea. But Bethlehem last year surveyed the stainless market meticulously, absorbed all the woe of established producers, and concluded in the end that available tonnage outlets were now spread unattractively thin. And such also seems to be the attitude of the various other large steel companies not now engaged in stainless manufacture.

Regarding production technique, every stainless producer is everlastingly trying to reduce the wide price spead between ingot and finished steel. A little progress has been made in reducing scrap losses, and one company is perfecting a finishing procedure employing a grit emulsion and an adaptation of a paper polishing machine, the result being that a cent or so has been lopped off the finished steel cast. But, on the whole, 20 per cent of the stainless ingot is still immediately sacrificed



as unsound metal, and almost 40 per cent of what's left goes to the scrap heap during subsequent rolling and finishing operations.

As to patents, there are over 900 live issues scattered throughout the industry, most of them having such narrow application that market influence is nil. The only basic patent group of widespread importance now extant is held by Krupp-Nirosta, and draw royalties from, say, 10 per cent of the total stainless tonnage. These Krupp patents are made up of an interlocking group of three issues (Nos. 1,617,334; 1,420,708; and 1,513,793) covering silicon additions to chromium-nickel steels (for resistance against scaling), and expire variously from 1939 to 1944. Another patent (No. 1,587,614) covers molybdenum additions to improve corrosion resistance, and expires in 1943. And two other patents (Nos. 1,538,360 and 1,538,337) blanket titanium additions to chromium-nickel analyses as a preventative against intergranular corrosion, these two expiring in 1942. Several other basic patents are in the hands of Electro-Metallurgical Corp., but little or no royalty collection is attempted. Aside from these very live issues, a constant shifting is under way behind the scenes to force through other issues of widespread influence. For the past several years, Krupp has attempted to secure coverage on low-carbon (0.07) chromium-nickel grades, which, though welded, would require no stabilization by subsequent annealing, but this claim was pretty well killed off during the year by the Commissioner of Patents. Currently, however, action is underway to achieve the same end in a different direction, and, also, there are now several interference suits kicking about in the courts on patents of minor coverage.

Several fairly attractive patent applications on other phases of the stainless industry are now filed at Washington, and, if allowed, these may be sufficiently powerful to have jurisdiction over a considerable tonnage of metal. And it is always possible, of course, that the Chemical Foundation might find it possible to convert some of its extensive research into a new patent, having basic coverage, or accumulate a group of selected existing issues, thus again gathering to itself some semblance of control over a sizable portion of the industry's tonnage. Any of these patent possibilities, however, at the moment seem unlikely to influence the market to any extent pricewise.

Analyses Modifications

No amount of dissection of the 1937 production statistics develops any significant trend over past years in consumption of various products and analyses. It is obvious that the past decade's upward trend in output, as shown in Table I, reflects a growing recognition of the fact that stainless steel is endowed with a unique combination of properties—strength, rustlessness, beauty and permanence—and it shows that fabricators are finding that this metal can be successfully adapted to meet certain inroads of competitive metals and readily match the rapidly shifting and stringent demands of progressive design engineers.

But to keep to the fore, the stainless metal today is far more complex than the metal of five years ago. Modifications of standard analysis groups are increasingly common—a little molybdenum, higher manganese, some columbium, more or less carbon or silicon, small additions of sulphur or selenium, minor variations in copper, or even major shifts in the chromium-nickel proportions—all to more completely match the metal with special applications and methods of fabrication. Unfortunately, demands for simplicity prevents the analyses breakdown in Tables I and II from showing these modifications, although they all are included in either the "all other" analysis group, or in the appropriate Cr or Cr-Ni classification if the modification is not too drastic.

Table II shows the well-known austenitic 18 Cr-8 N grade as still the most popular of all analyses, demands being mostly for sheets and strip. This non-hardenable type is readily fabricated into almost any commodity, and is particularly resistant

to corrosion, even being practically immune to drastic salt water attack under wet-and-dry conditions. In the fully softened condition (necessary for maximum corrosion resistance), the analysis is used for over half of all new store front construction, during the year over $1,000,000 worth went in dye vats and other textile applications, and food handling equipment accounted for several times this amount. In the work hardened condition, with a tensile strength around 150,000 lb. per sq. in., the same 18/8 type goes extensively into the new streamlined trains, the major user for this purpose taking over 2500 tons in 1937, mostly strip.

A good proportion of the 6211 tons of strip shown (Table II) in the 12 to 14 per cent chromium classification is cutlery stock, and much of the sheet, tube and bar grades go into furniture, architectural work, etc., or any other application where severe corrosion is not a bogy. Low carbon analyses of 16 to 18 chromium are more corrosion resistant, and most of the 5100 tons of strip shown in Table II finds an outlet in autobody trim and molding. Ford alone used slightly over 2000 tons of 12-14 Cr and 16-18 Cr strip stock in 1937; another large auto maker consumed 1450 tons of the 18 Cr grade for decorative parts and 295 tons of structural and accessory parts of an analysis near 14 per cent Cr. At the moment auto companies are in a dither regarding stainless application for '39 models, and are not quite decided whether to "dress 'em up to sell" or "skin 'em down to cut costs." But there is every reason to believe that more stainless will be used in the coming year, as Oldsmobile is seriously considering a stainless-die casting license frame and light, General Motors may use a stainless trim along the lower body line, and Chevrolet is considering the adoption of a stainless hub cap shell.

The bulk of the 18,908 tons of bar stock shown in Table II of all analyses is dosed with sulphur or selenium for free machining, although the 581 tons of bars listed under the "all other" analysis is for the most part chromium-silicon valve steels of the 8/3 type (with some variations during the year), this same analyses appearing as "all other" in the sheet, plate and tube product classifications, and being used for purposes involving heat resistance up to temperatures of about 1660 deg. F. Strip and forgings in the "all other" analysis group also include turbine blade stock the types generally favored for this use being 13 per cent chromium, 18/8 chromium-nickel, usually with special additions, and 35-12 nickel-chromium also with small additions of other elements. This latter analysis has extreme service life but suffers from being difficult to manipulate and machine and being comparatively very expensive.

The usefulness of molybdenum as an alloying element in plain steel has been exemplified in many directions, and during the year the continued acceptance of this addition to chromium-nickel stainless steels was very apparent, accompanied usually with slight drops in the chromium and nickel content. Suitable moly additions greatly improve resistance to organic and mineral acid attack and other special reagents. It also has value in maintaining the hardness of the martensitic stainless steels on reheating. Also, increasingly popular is the alloying of 1½ to 2 per cent manganese to moly-bearing or plain chromium-nickel analyses, to improve hot working (such as piercing) and to give a tougher weld. The Navy's new specifications permit such a manganese addition.

Castings Up 35 Per Cent

Like the makers of rolled stainless steel, founders had a comparatively satisfactory twelve months in 1937. But comparatively does not mean beer and skittles, even though a probable gross of about $10,000,000 was taken in by the industry. The casting division of the stainless industry is still plagued by excess capacity, high scrap losses (although determined research is reducing this percentage), and periodic market turmoil as smaller jobbing foundries blindly jump in and out of stainless production on a shoestring. Prices generally advanced a few cents per pound during the year, but were hard pushed to offset increased labor and production costs. In gathering 1937 production figures on castings, the writer was fortunate this year in having the cooperation of the Alloy Casting Association, Inc., and more complete data from several of the larger producers. The result is that the 1937 production total of 7999 tons and the analyses breakdown for castings shown in Table I are undoubtedly accurate to within several per cent. The 7999 tons of castings poured in 1937 represents a 35.5 per cent advance over 1936 output, and establishes a new high production level.

In castings, as in rolled steel, the more common analyses are being modified each year for special applications. Production is concentrated mostly in the heat-resisting analyses rather than in the corrosion resistant analyses so prominent in rolled stainless, although of course the heat resisting steels, generally speaking, have stainless characteristics. The 1165 tons of 18/8 chromium-nickel castings for 1937 (Table II) went mostly into stainless applications, such as pump casings, impellers, valves, conveyor sections, and for heat resisting service at temperatures between 800 deg. and 1500 deg. F., for this latter service being occasionally modified.

However, the bulk of castings output (1430 tons in 1937) remains in the 25/12 chromium-nickel range, being used for baffle plates, superheater slings, supports and other uses where metal is exposed to furnace gases at very high temperatures. If great strength and very high scale resistance is wanted, a little tungsten may be added to this analysis, and where it is imperative to have metal working up to temperatures as high as 2100 deg. F. with substantial strength, it is necessary to go into the really complex nickel-chromium steels shown in the "all other" analysis classification of Table II. Castings in the 12 to 14 chromium range (108 tons in 1937) resist scaling up to 1470 deg. F. and are immune from deterioration by sulphur-bearing gases. If the chromium is increased to 18-19 per cent (332 tons in 1937) the limiting temperature is raised about 1500 deg. F., and if raised to 28 per cent (the 18-30 Cr group with 1937 output of 262 tons), the steel can be used continuously at temperatures up to 2100 deg. F., although, because they are ferritic, the high-chromium steels are comparatively weak at temperature.

Exports Bulge

Industrial heat-resisting applications in 1937 accounted for most of the castings produced, although chemical and textile equipment took a sizable tonnage. For rolled stainless, the automotive, food, beverage, chemical, textile, railroad and airplane industries consumed, say, 55 per cent of the output. In both castings and rolled steel, however, miscellaneous outlets are increasingly important, now taking 40 to 45 per cent of total production. Another and rather unexpected outlet in 1937 was export, an outlet which never before had accounted for much tonnage and one which already has petered out as other countries catch up armament demands. The year's stainless exports were as follows:

Ingots, blooms, etc.	500 tons
Bars	222 tons
Plates	153 tons
Sheets	1,751 tons
Strip	668 tons
Castings	940 tons
Forgings	200 tons
Tubular goods	325 tons
Total	4,759 tons

Most of this 4,759 tons of exports was split between Japan and Russia, two countries which lag in stainless metallurgy and were, during 1937, unable to secure regular supplies from England and Germany. Although American stainless producers readily admit Russian shipments, they are curiously reticent regarding Nippon's commitments, this being probably a reflection of widespread anti-Japanese feeling here. The 1937 export bulge is not quite a closed book, however, as Russia now wants to return an appreciable tonnage purchased late in 1937, reason unknown, and such action coming at a time when the market is pretty inactive can have a depressing effect.

That standard analyses of the past decade are undergoing constant modification, usually of a slight character, has previously been emphasized. But the market has been particularly free of drastically different and new analyses, the only two recent developments of such caliber being foreign in origin and only hesitatingly gaining a foothold here. Both these new steels—chromium-manganese and chromium-copper stainless alloys—have previously been described in varying detail in THE IRON AGE, but the receipt of further data and the possibility of growing acceptance here makes additional mention worth while.

Stainless steels on the chromium-manganese base have long been in Europe's laboratories, but the alloy first had a prominent market debut in Germany a year or so ago, the object being to minimize or avoid the use of nickel of which Germany neither has any nor wants to use foreign exchange to secure. Little if any of this steel has appeared in this country, although any maker would probably turn out the alloy on order. Electro-Metallurgical Corp. sings its praises (of which there are a number), because acceptance would increase the consumption of low-carbon ferrochromium (which is necessary in manufacture), and International Nickel Co. when pressed will point out certain undesirable characteristics.

An approximate substitution of manganese for nickel, with chromium unchanged, is now quite popular in Europe for knives, forks, platters, chafing dishes, etc., the material being readily recognizable because of its silver-like luster, a quality particularly advantageous when compared with ordinary stainless' harder, more brittle color. An austenitic steel of equal chromium-manganese content is now popular in Austria for deep drawing into food handling equipment, and a high manganese steel (25 to 40 per cent) in combination with about 7 per cent chromium (and low carbon) is finding application for highly machineable non-magnetic applications, the material being conspicuous because of its 98 per cent ratio of a 0.2 per cent elastic limit to the ultimate strength.

Austenitic chromium - manganese

TABLE II

Product and Analyses Breakdown for 1935, 1936 and 1937 Production of Finished Corrosion and Heat-Resisting Alloy Steels

(Net Tons)

Type of Finished Steel		Analysis Groups, Per Cent Composition* 18 Cr 8 Ni	25 Cr 12 Ni	12 to 14 Cr	16 to 18 Cr	18 to 30 Cr	All Others (Cr or Cr-Ni)	Total Output, All Analyses
Sheets	1935	6,486	412	1,480	3,253	56	373	12,060
	1936	9,212	943	3,521	3,508	154	269	17,607
	1937	**12,652**	**1,586**	**3,284**	**4,562**	**213**	**1,223**	**23,520**
Bars and heavy rods	1935	2,279	681	3,340	1,918	121	573	8,912
	1936	4,981	415	4,114	3,552	75	943	14,080
	1937	**7,372**	**1,010**	**6,361**	**3,463**	**121**	**581**	**18,908**
Strip (hot and cold-rolled)	1935	5,504	736	1,312	1,504	316	1,175	10,547
	1936	9,550	488	3,886	2,538	118	148	16,728
	1937	**8,611**	**236**	**6,211**	**5,100**	**73**	**352**	**20,643**
Tubular goods	1935	592	114	312	252	328	210	1,808
	1936	621	108	609	360	40	86	1,824
	1937	**1,016**	**34**	**407**	**394**	**383**	**1,518**	**3,752**
Plates and shapes	1935	1,203	26	586	101	11	126	2,053
	1936	1,109	126	447	751	32	96	2,561
	1937	**1,156**	**325**	**420**	**108**	**88**	**228**	**2,325**
Wire and light rods	1935	1,982	102	368	301	4	473	3,230
	1936	713	201	1,616	885	86	230	3,731
	1937	**1,241**	**205**	**908**	**880**	**114**	**514**	**3,862**
Forgings	1935	553	122	773	576	20	226	2,270
	1936	1,889	482	792	71	69	338	3,641
	1937	**735**	**115**	**862**	**778**	**128**	**223**	**2,841**
Total (by analysis)	1935	18,599	2,193	8,171	7,905	856	3,156	40,880
	1936	28,075	2,763	14,985	11,665	574	2,110	60,172
	1937	**32,783**	**3,571**	**18,453**	**15,285**	**1,120**	**4,639**	**75,851**

GRAND TOTAL, all finished steels, all analyses—for 1935 = 40,880 net tons.
—for 1936 = 60,172 net tons.
—for 1937 = 75,851 net tons.

*Analysis groups are approximate; in several classifications each element may vary as much as ±2 per cent from the range shown.

steels (max. 15 per cent Cr) show fair resistance to weak acids and salts, withstands sulphurous gases at temperatures under 1660 deg. F. remarkably well and have demonstrated extremely high creep resistance in the same temperature range. These characteristics have resulted in considerable application for furnace construction.

Probably the most forceful talking point for the chromium-manganese cutlery grades is its pleasing silver color, although a color very similar has been obtained with comparatively high nickel grades, such as a Cohr Rustfri type (Denmark) of cutlery which the writer for the first time encountered recently in a small importing shop in the Spanish quarter of Los Angeles. In the laboratory this stainless analyzed 0.09 carbon, 0.28 manganese, 13.16 chromium, 12.56 nickel and 0.06 copper, the structure being typically austenitic with excessive carbides. The color of this steel was very pleasing, and seemingly the material would find a ready market here, for table ware particularly.

Whereas the chromium-manganese analyses and the high nickel cutlery type above indubitably are inherently special steels for specialized applications, proponents of the unconventional alloying of arrant copper (high percentages) with chromium to the total exclusion of nickel claim extreme flexibility with consequent widespread applicability. When high tensile strengths are desired the air-hardening varieties will be the datum, and where softness, deep-drawing and hardening by cold rolling are desired the non-air-hardening analyses are recommended by the developers. Semi-commercial manufacture of the 18/8 chromium-copper stainless steels still is confined to England, although there is in this country some rather extensive experimentation with both high and low-copper types.

Existing stainless analyses of course are strongly entrenched with both producer and consumer, but seemingly the test results on chromium-copper steels (Digby's Cypritic types) are so dramatic that instead of eschewing such sizable copper additions the producer may inevitably encourage them. Emphasizing first the supposedly low cost factors arising from the substitution of inexpensive copper content and, second, the ease of fabrication and rolling, advocates of this alloy insist that by heat treatment and rolling variations, the metal's physical properties can be shifted over the very wide range now serviced by numerous straight-chromium and chromium-nickel specialized analyses. The metal drawn into wire is almost fatigue-free, and on this point Dr. B. P. Haigh (of England) has said, "it is a most important point, that the metal is not merely 'better' in respect that it resists longer, but is actually 'different' in respect that it promises to resist indefinitely."

The metal has excellent free-machining characteristics, which should make it popular with fabricators, who bewail the run-up in costs and the troubles with regular stainless grades because of hardening, even sometimes those grades containing sulphur or selenium. Also, there is practically a complete absence of weld decay in these steels, and the metal can be perforated with ease in either the annealed or tempered state, one English fabricator of punchings reporting no tendency for the remaining metal to adhere to and pull away with the punch, as so often is the case with other stainless analyses.

All these qualities are admirable qualities, and, even with some disadvantages, there is good reason to believe that additional development will eventually bring the chromium-copper (either or both high and low Cu) steels firmly into the consuming market, partially in competition with existing grades and particularly in special consumption areas at present entirely neglected or only partly covered by existing forms.

New Outlets

All the analyses modifications and halting excursions into entirely new analyses fields give promise of a healthy future for stainless. But the future will also depend on constantly widening consumer acceptance, for only by such expansion can the sharp upward production trend shown by the statistics herein be maintained. Profitable tapping of two additional sizable outlets — airplane manufacture and home consumption—is to the author apodictic, and, what's more, scheduled for the near future.

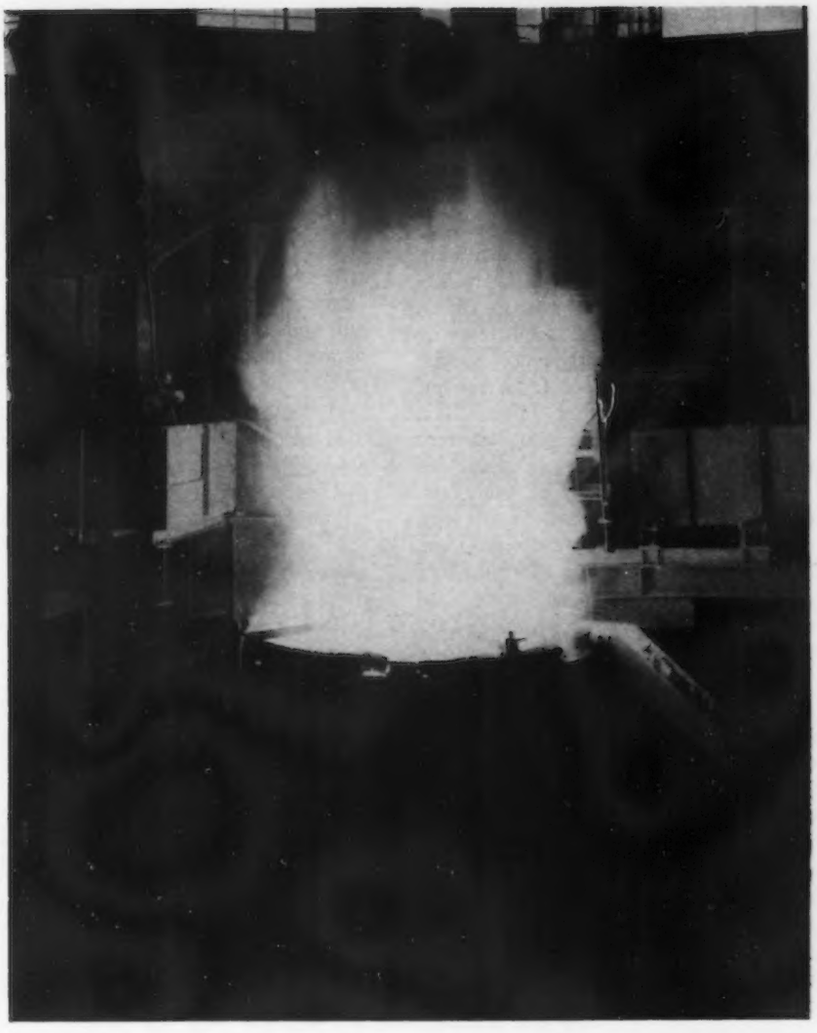
Some stainless has long gone into airplane fuselages, tremendous quantities of chromium-molybdenum tubing (SAE X-4130, but not stainless) is welded for the plane's skeleton. During the past year there has been a decided tendency to substitute stainless cabin fixtures for the more common cadmium plated SAE (2500) steels, and the use of the 18-8 grade for exhaust gas collector rings, firewalls, etc., or for all those parts where extreme corrosion resistance is necessary, is regular practice.

But the stainless producer wants to cover wing and fuselage with his metal, and such an outlet could conceivably run into very attractive tonnage and far more attractive prices. Aluminum alloys currently rule this domain, but strength-weight ratios with stainless are every bit as satisfactory (better for very large structures, according to Pan-American), and with perfection of advanced fabrication and welding technique the stainless maker fully intends to secure a good share of this tonnage.

The Navy department has long held out tentative but sizable orders to those stainless makers who would supply them with sheets of more than 100,000 lb. per sq. in. tensile strength, 35 in. or more in width and, unfortunately, 0.005 in. thick. These are tough specifications, specifications that no stainless maker has seen fit to commercially fulfill, even though such material has been turned out in small lots. Several companies are devoting considerable energy and more money to rolling such material, and one firm is currently working a couple of high-powered mathematicians in Germany to a frazzle to perfect a cluster mill to do the job, a job that trial runs on the mill indicate will eventually be done at high speed, excellent gage uniformity, reasonable cost, and with considerable dependability.

And while several companies are working out a more determined assault on the highly attractive aircraft industry, another company — Ludlum Steel Co. of Watervliet, N. Y.—has perfected its Ludlite to make stainless available to that sizable potential market, the average man. Paper-thin stainless permanently combined with a non-metallic backing, all available in plain or decorated sheets, tile, shingles, etc., gives to the home builder and home owner a long-lived, beautiful, comparatively inexpensive, easily fabricated and simply applied metal which can have a multitude of applications in all types of building construction and decoration. The development has occasioned tremendous interest, interest from the great group of people who will consume the product, and both Ludlum looks to stainless in this form to bridge the heretofore wide gap between the producer, who has a lot of stainless to dispose of, and the everyday individually unimpressive consumer, who knows of and wants the metal, a gap which when fully bridged can account for impressive quantities of stainless.

A.I.M.E.'s Pool 1937's Progress



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BACK in optimistic 1926, 39 open hearth technicians gathered in Buffalo for the fifth American Institute of Mining and Metallurgical Engineers open hearth conference, in "just-around-the-corner" 1930 Buffalo was host to 123 men at their eleventh conference, and two weeks ago Buffalo again was host, there being this time a record attendance of 370 men assembled for the twenty-first open hearth conference in the none-too-optimistic year of 1938. Traveling from all over the country, from plants operating at red-ink rates, those attending were well conditioned to throw their 1937 experiences into a common pool, and from that pool fish out grains of information possibly leading to the production of better steel, quicker steel, and less costly steel. A lot went both in and out of the pool, many a problem was worried to a frazzle, and more than one moot question had to be satisfied with a partial or no answer. And in all it was another breezy and informal gathering typical of this unique group of open hearth technicians, and, to somewhat the same extent, typical of the 60 men attending the Blast Furnace Committee meeting, who were assembled for the second time in separate and simultaneous sessions with their open hearth brethren.

Following a few introductory remarks by L. F. Reinartz, of Armco, general chairman of the meeting, the initial session on Wednesday morning, April 20, was turned over to E. L. Ramsey, of Wisconsin Steel Co. First item up for discussion was the use of CO_2 bombs for breaking up slag. Such a Cardox bomb, made by Safety Mining Co., 307 North Michigan Ave., Chicago, is essentially a heavy steel tube 2 in. in diameter and 4 ft. long, sealed at one end by a threaded cap which contains the firing mechanism, and at the other end there is a soft steel disk held in place by a threaded discharge cap. This cap has four angle port holes through which the carbon dioxide gas is released when the steel shearing disk is ruptured. A chemical heating element is inserted in the cartridge when it is assembled, and this element is set off when the cartridge is discharged by means of an electric current. This heating element burns, converts the liquid carbon dioxide to the gaseous form almost instantly, and causes the shearing disk to rupture, the shell proper being stronger than the disk. The release pressure is determined by the thickness of the shearing disk, and can be made to vary from 6000 to 20,000 lb. per sq. in.

In describing his experiences with CO_2 bombs, Mr. FonDersmith, of Armco, pointed out that the equipment had been used in two of Armco's shops, and in both places the conclusions arrived at were similar, that being that the main advantage lies in the saving of furnace production time, which is particularly advantageous when melting schedules are tight.

With no crane facilities in Armco's No. 1 shop to lift deposits out in one or two chunks, it became necessary to

shatter the slag into small lumps. This is done with a CO_2 bomb with a 40 per cent man-hour saving, but against this labor saving of $145 per furnace there must be balanced the cost of ten Cardox shots at $10 a shot, the result being a net labor saving per rebuild of $45.

No. 2 shop has crane facilities capable of lifting deposits out sometimes in a single chunk, and Cardox usage saves rebuild time from 16 to 24 hr. Because of these crane facilities only one Cardox shot is made per pocket, the idea being to shoot from the pit side with a single shot (hole 48 x 2½ in.). This single shot shatters the pit half of the pocket, cleaving off rather cleanly to a row of four 7-ft. holes which are put in from the end of the pocket and half way back. Thus after the shattered half is cleared away it becomes an easy matter to turn the unshattered half around in the pocket, getting it out in one piece.

It has been Armco's experience that Cardox offers a tool of merit where it is used discriminately, that is, where the demand for tonnage makes speed in rebuild essential; but under conditions of low operation, Cardox's value is far less important.

At Inland the CO_2 experience paralleled that of Armco. A question was asked as to the use of dynamite rather than CO_2 bombs, but one user stated that dynamite has resulted in premature explosions in hot slag. Cardox, on the other hand, is not influenced by insertion in a red hot hole, although it is recommended that a stream of water be run into such holes both during and after drilling. Also a dynamite explosion carries throughout the pocket, whereas the Co_2 explosion is more localized, but even so it often loosens up a few bricks or the division wall. However, a false wall can be employed to take care of the shock.

A New Magnesite

From slag pockets, the conference's discussion shifted to furnace bottoms, with considerable interest centering in the best kind of magnesite to use for furnace bottom repairs.

Being Canadian, Mr. McKune, of Steel Co. of Canada, stressed his preference for Canadian magnesite, whereas Mr. Bower, of Republic, being American, preferred domestic grades. Without patriotism, the discussion averaged out pretty much to the effect that all the magnesites were fairly similar, although Mr. Buchanan of Armco stressed that the Austrian grade was often inclined to be nonuniform in analysis as shipments were made up from many different mines. J.&L. ran tests on Austrian and Washington grades but could arrive at no definite conclusions regarding possible differences, whereas Mr. Devaney, of Carnegie-Illinois, expressed preference for quick setting Canadian material where speed was essential, and also mentioned that Thomasite has certain definite advantages. As to relative speed of repair, Mr. Berner, of Inland, stated that for one major repair job it was found that Canadian magnesite could be laid in at the rate of 922 lb. per hr. whereas the Washington grade went in at 736 lb. per hr.

Mention of seawater magnesite disclosed that few open hearth men had yet encountered this new product, which is less than a year old and is sold by California Chemical Co., Chrysler Building, New York, at a price equal to that of the mined material. This material is not a natural magnesite, but originates in magnesia bearing brines, which source has already been in use in Europe and in this country for the production of magnesia metal and magnesia derivatives.

Magnesia containing brines were found available in California from producers on San Francisco and San Diego Bays, employing solar evaporation of sea water for salt recovery. After the salt has been extracted the resultant mother liquor "salt water bittern" remains. This is pumped to the bromine plant for bromine extraction, the discard bittern then being forwarded to the magnesia plant for extraction of these values. To this high purity material, necessary additives are accurately blended before burning, and it is the perfect control over the quantity and analysis of these additives which makes the final precipitated deadburn at all times uniform, as compared with mined material which varies considerably.

In the first tests, precipitated deadburn was employed having the chemical composition of mined material, and while service results of the former compared favorably with the latter, it has been decided to make certain changes in the composition in the deadburn (sea-water) which are claimed to impart to it a marked superiority. Several mills which have employed this magnesia experimentally reported very favorably regarding its performance.

Chrome Hearth Bottom

During the period the conference devoted to improvements in installing furnace bottoms, Mr. A. F. Franz, of Alan Wood, presented a compilation of data on the building and burning-in of No. 4 furnace (110 ton) bottom, and also a study of bottom temperature gradient. The bottom material was for the most part products of E. J. Lavino Co.

The sub-hearth consisted of a leveling layer of grade A-3 chrome ore, two flat courses of chrome brick, one soldier course of chrome brick, and 5 in. of Plastic K-N. All brick in this bottom were bonded and definite joints allowed for expansion. Following construction of the sub-hearth, a wood fire was started on the Plastic K-N, coke gas was admitted to the furnace 18 hr. later, and oil after another 12 hr.

During construction, three thermocouples were placed in the bottom of this furnace, couple No. 1 extending through the soldier course of chrome brick to the bottom surface of the Plastic K-N; couple No. 2 extending through the two flat courses of the chrome brick to the bottom of the soldier course. Couple No. 3 was at the inside surface of the pan.

The magnesite working hearth was begun with a shot of 3000 lb. of finely ground magnesite without slag addition, followed at 4-hr. intervals with the Alan Wood's usual practice of 1500 lb. of grain magnesite and 375 lb. of ground basic open hearth slag. The SiO_2 content of the bottom, by chemical analysis, during the last stages of bottom making ranged from 11 to 15 per cent. So that the silica content might be lowered, high silica bearing slag (16 per cent), which was being charged in the ratio of 1 to 5 of magnesite, was discontinued and Cordol (double burned dolomite) in the ratio of 1 to 1 was substituted during the last four days of bottom making. Final SiO_2 analysis, after slag wash, was 9.7 per cent. The materials used for bottom making were in the proportion of 71.9 per cent magnesite, 15.9 per cent slag, and 12.2 per cent Cordol.

As shown in the graph in Fig. 1, after the magnesite bottom built up, the temperatures in the sub-hearth decreased slowly, and, immediately upon charging the first heat, the temperature at No. 1 couple location dropped rapidly, trailing off to a fairly constant reading, except when jiggers of hot metal were added and, at this time, temperatures at both No. 1 and No. 2 couple locations increased 40 deg. to 80 deg. Temperatures at No. 1 couple location settled back to a flatter curve more rapidly than did No. 2 couple location, which stayed at the

higher temperature from 2 to 4 hr. After the fourth heat very little fluctuation was noted in the temperatures at the different couple locations at any time.

With the experience in making this bottom at hand, the Lavino engineers and Mr. Franz were inclined to agree with the opinions of other observers; that, iron oxide, running down off the scrap and through the lime, forms fluid calcium ferrite, which could penetrate down between the grains of magnesite, reacting with the slag silicates already present, to form solid orthosilicate, the iron oxide at the same time diffusing through the magnesite. The films of orthosilicate thus formed among the magnesite grains would cut down the conductivity of the bottom considerably.

The total cost of the bottom, excluding brick work, was $7,825.38, the fuel cost per inch being $88.76 for the Plastic K-N and $198.60 for the magnesite, and the fuel plus labor cost per inch being $113.67 for Plastic K-N and $242.43 for the magnesite.

Olivine Popular

While dealing with various furnace repair features, several men mentioned the use of a new material, Olivine, for this purpose, and the generally favorable consideration given the material naturally excited numerous questions on the part of others interested in this vital problem, most of whom so far have had no contact with Olivine.

Wheeling Steel's representative stated his company had used Olivine and was satisfied, and another user mentioned that his company found that Olivine showed a big saving in maintenance, there being comparatively less gouging in the back wall (semi-sloping). Olivine has use other than just for repair; for Armco's FonDersmith reported that his company has a front bulkhead built of the rough material just as it is mined. This bulkhead was put in one end and a silica bulkhead in the other end of a furnace. The silica bulkhead was repaired at 110 heats and replaced at 185 heats. The Olivine is still in at 231 heats, although it has been necessary to replace the chrome brick at the top of the bulkhead at 205 heats. The Olivine bulkhead was reported to have cost $96, against $92 for the silica bulkhead.

In view of the good reports on the use of Olivine and the interest displayed in the material, there is justification for reporting these additional details regarding the material. Olivine (name comes from color) is a translucent mineral usually occurring in granular aggregate; it is a silicate of iron and magnesium $2(Mg,Fe)O,SiO_2$, and is found in nature as a solid solution of fosterite (Mg_2SiO_4) and fayalite (Fe_2SiO_4).

Olivine is found in large quantities in western North Carolina, the material from this particular section being superior to Olivine found in other parts of the country, according to the Bureau of Standards. The softening point is Cone No. 35 plus, or over 3245 deg. F. The total linear thermal expansion of the natural mineral is 1.082, being somewhat lower than

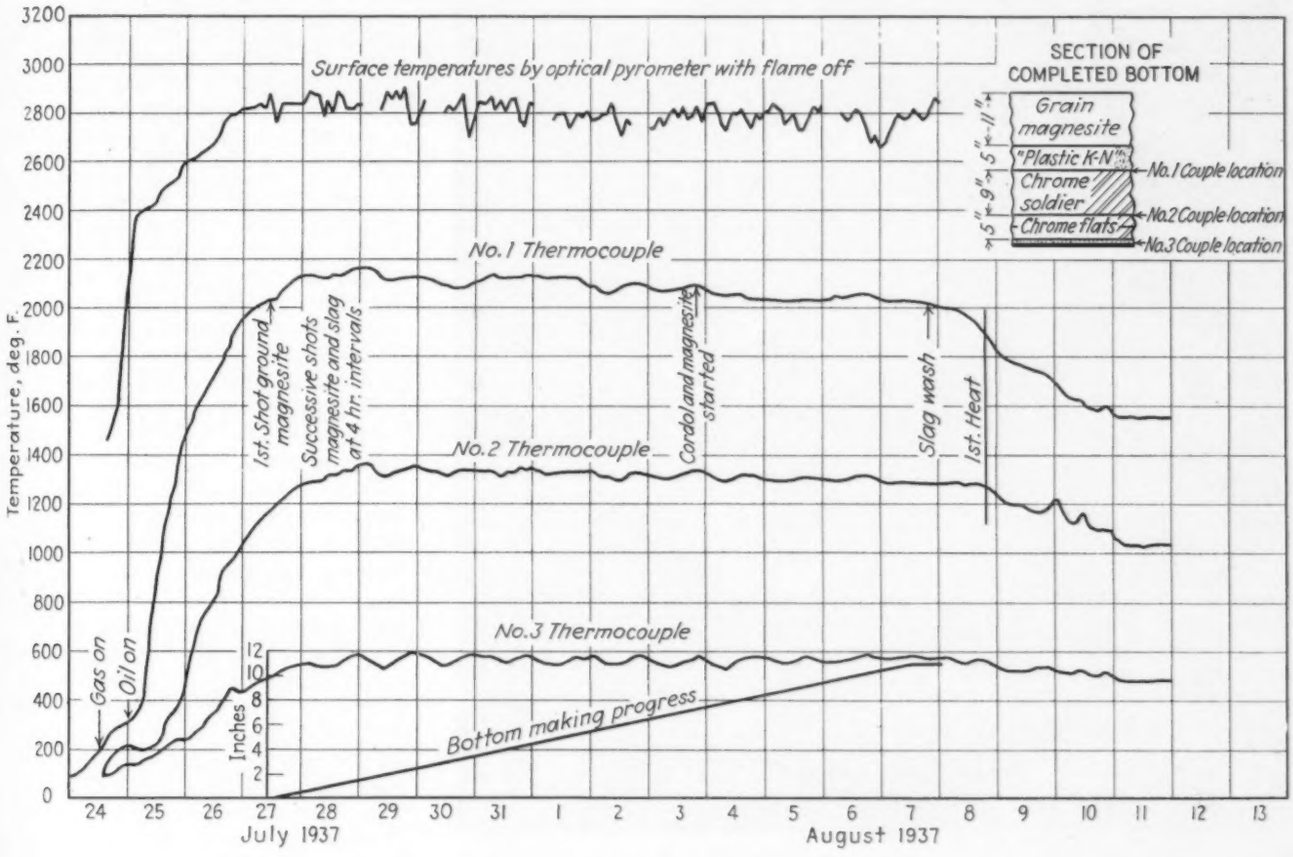

FIG. 1—This is how temperatures varied in Alan Wood's new furnace (110 ton) bottom, during both bottom making and subsequent steel making.

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magnesite in this respect, the specific gravity is 3.255, and the shrinkage of the rock when heated to 2550 deg. F. is 3.3 per cent.

Olivine has been used commercially in basic open hearths for some time and the largest share of the material has been used to build the semi-sloping type of back wall. Here the rough rock is set in finely ground chrome ore mortar, the wall usually being started below the slag line and carried to a point about six inches from the roof. Two courses of chrome brick are laid on top of the wall to avoid direct contact between Olivine and silica as one is basic and the other acid. It is always necessary to separate Olivine from silica and clay bricks in places where the heat approaches 3000 deg. F., this being done by using chrome brick or chrome ore.

When the temperature is increased on a new Olivine wall the fayalite and such serpentine as the rock may contain tend to fuse out leaving behind the fosterite (magnesium silicate). When Olivine is used alone the shell left after the fusion of these materials is porous and subject to attack by iron oxide. When chrome ore is used as a mortar the low fusing elements combine with the chrome ore to form a black glass which presents a solid non-porous face, which offers little foothold for iron oxide and other disintegrating agents.

Olivine is always used in the rough rock form. Where it is necessary to build a straight wall with no slope it is customary to add a small percentage of water glass to impart a little cold set.

Experiments are being conducted in the use of Olivine with chrome as a taphole mixture, in the hope that it might replace the more expensive magnesite now in general use. Also, runners are being built to make a semi-permanent carrier for the steel from the furnace to the ladle. This work is still experimental, but linings of Olivine and chrome have had a life of 20 heats without repairs or additions of any new material.

Lump Olivine has been used to repair gas uptakes, and, mixed with magnesite, it has also been employed to burn in a bottom. The material costs $7 a net ton, at the mine.

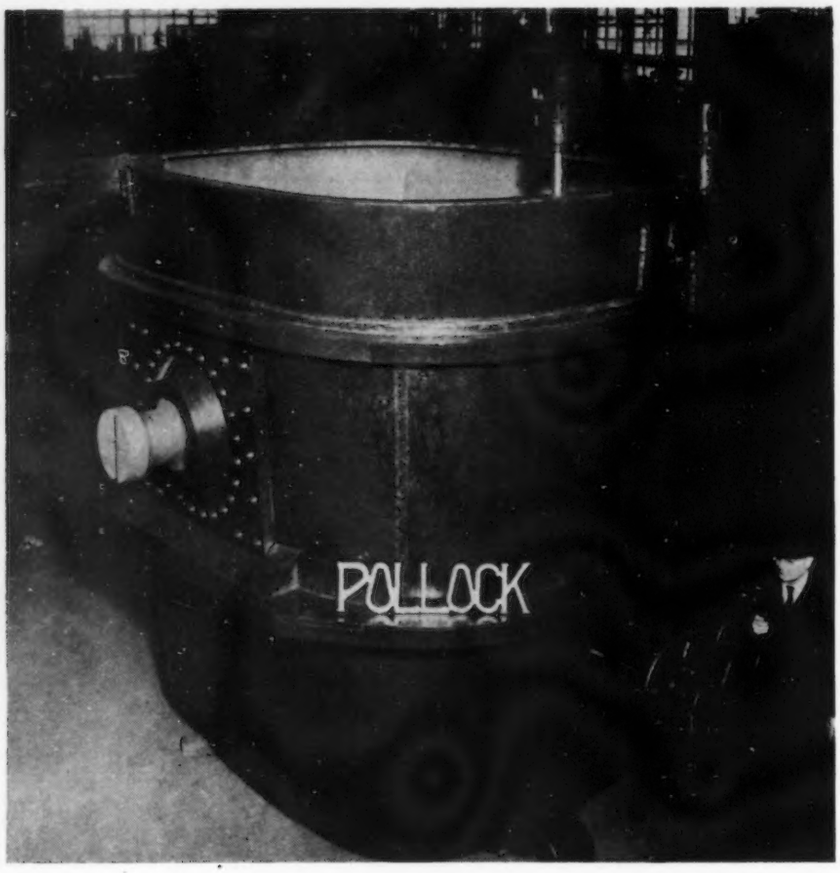

FIG. 2—Not only can welded ladles be lighter than riveted jobs, but the design may be quite radical, as is this large almost square Lukens ladle.

Welded Ladles

During the discussion of welded construction in the open hearth, Mr. Lindemuth, of William B. Pollock Co., gave a brief description of the history of welded ladles, listed the size and shape of such ladles now in service, and sketched out the various variables in ladle construction.

Currently, there are 180 welded ladles scattered in 21 different shops, the total welded ladle capacity being 22,020 tons, the average capacity being 122 tons, maximum being 165 tons, and minimum being 55 tons. Maximum ratio of height to width is 1.27, minimum 0.85, and average is 1.15.

Eighteen of the 21 installations are elliptical ladles. The reason for this is that the welded ladles go into plants where the size needs to be increased, whereas the height is limited to various clearances, and the diameter across trunnions has to be kept the same in order to fit existing crane hooks and ladle stands. Thus, the only way to secure increased size is to increase the other diameter, the result being an elliptical shape. Otherwise there is no reason for the shape.

As to saving in weight because of welding, it is difficult to arrive at any figure because weights of riveted jobs vary so much. For the latter, however, the weight, without linings, stopper rigs and spouts, generally runs anywhere from 21 to 27 per cent or more of the rated capacity of the ladle. The weight of welded ladles, because they can be designed and fabricated much more accurately, varies less, and from available data is in the neighborhood of 16 to 17 per cent, except for one installation which is 12 per cent. Therefore, in general it is apparent that without increasing the load on the crane hooks and keeping the same lining, the welded ladles permit an increase in size of heats of approximately four to five per cent over the heavier riveted jobs. And this is the reason why most riveted ladles go into existing plants, to get increased size of heats without increasing the loads on the cranes. As an example of the radical construction made possible by welding note the almost square shape in Fig. 2.

From welded ladles, the attention of the convention was switched to ingot mold design, and a brief review of the trend of such design since 1926 (when the first continuous mill was installed) to the present time was given by E. J.

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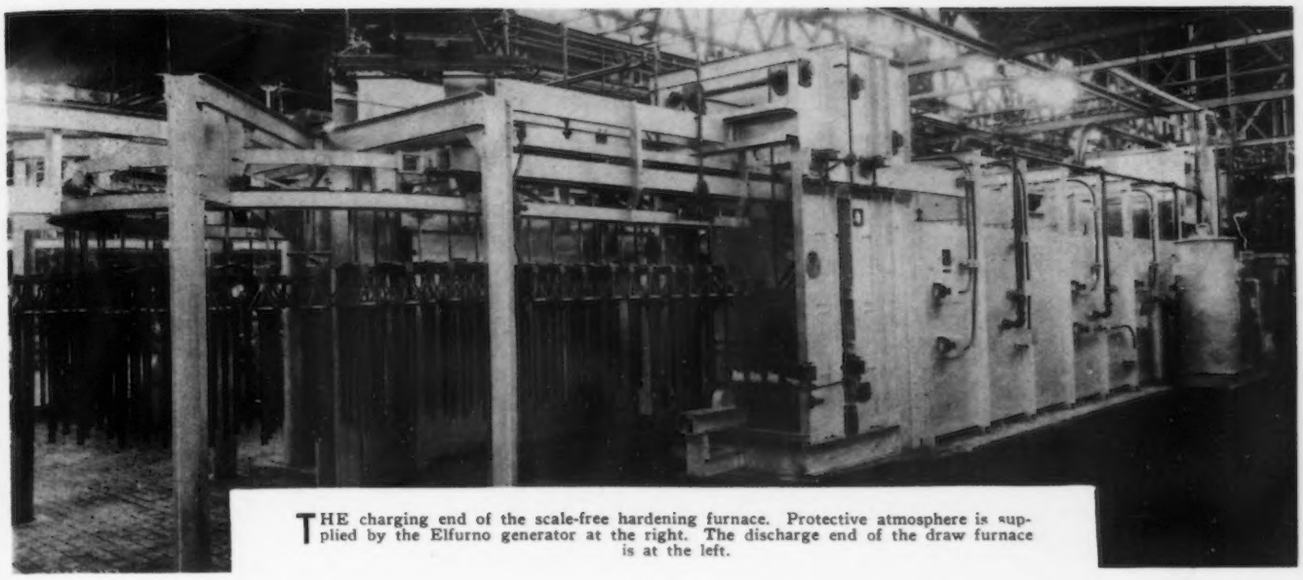

THE charging end of the scale-free hardening furnace. Protective atmosphere is supplied by the Elfurno generator at the right. The discharge end of the draw furnace is at the left.

Electric Heat Treatment for the Modern Car

By W. F. ROSS

Electric Furnace Co., Salem, Ohio

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AN automobile axle must withstand sudden shock as well as heavy twisting loads. Thus, it must be so heat treated to impart a crystal structure to stand up under such demands. This treatment consists in refining the granular structure of the steel axle by means of high heat, uniformly applied, and preserving the resultant structure by rapid cooling in a quenching medium. The strain set up by this cooling must be relieved by drawing, that is partially annealing the hardened piece at a temperature well under that at which the steel might begin to glow with the heat. These three steps in the treatment result in the happy medium of steel hard enough to satisfy modern conditions of usage and still tough enough to overcome the tendency toward brittleness characteristic of steel that has been hardened only.

Pontiac Motor Co. has recently installed an electrical double furnace unit to so treat axles. Unique features of the installation, which was constructed by the Electric Furnace Co., include grids from which electrical heat is radiated, an automatic control system, and a means by which a non-oxidizing atmosphere is maintained within the high-temperature hardening furnace to eliminate scaling.

The hardening furnace, with the gas-seal hoods at either end, is some 40 ft. long by 7 ft. wide, and extends 12 ft. above the floor at its highest point. The furnace shell is constructed of sheet and structural steel, electrically welded to insure gas tight joints. Layers of insulating and high-heat resistant brick line the sides, top and bottom of the furnace, leaving a chamber of approximately $3\frac{1}{2}$ x 4 ft. Heavy doors at either end of the furnace seal in heat and atmosphere, sinking into pits when opened. The gas seal hoods are chambers in which the doors operate, together with adjacent elevators, one in each hood. A frame outside of either hood carries rails, upon which a second elevator runs, operated as part of the mechanical handling system by which the work is passed in and out of the furnaces.

At the discharge end of the hardening furnace, a large tank is embedded in the floor and filled with a quenching medium circulated by means of a centrifugal pump.

To the ends of the hardening furnace framings are attached semi-circular tracks, running to the end of the draw furnace, which is similar to the hardening furnace in construction, but somewhat lighter in insulation. The draw temperature is not sufficiently high to form scale upon the axles, and consequently no provision is made to fill this furnace with a non-oxidizing atmosphere.

(CONTINUED ON PAGE 72)

The Case Study Method of Analyzing

CHAPTER 28 of a Series on Materials Handling Methods and Equipment.

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THE factors which must be considered in any comprehensive study of the costs of industrial truck operation as compared with other means of handling vary so greatly from case to case that it is well-nigh impossible to lay down a set of inflexible rules to guide the analyst. The best that may be done is to discuss as carefully as possible the major factors which are encountered, and in applying them to suggest the use of liberal doses of common sense. Once upon a time, back in the days of the man with a wheelbarrow, handling was practically all on a horizontal plane, with lifting held rather closely within the natural limits of the capacity of a pair of human shoulders. Today, power has added wings to feet and enormously multiplied the leverage of arms.

Nowhere is this seen more clearly than in the case of the industrial truck. While still fundamentally a means of transportation, this device is now a real "handler"; picking up its loads, elevating them to heights unreachable by unaided human effort, and setting them down precisely where desired, with speed and safety unimaginable in the old days. But it is just because the industrial truck does so many things so supremely well, that no rules may be written. For, no sooner does one say "An industrial truck will do thus and so" than along comes a new model which does many more things.

It is impossible, for instance, to compare the operation of the older "burden carrying" fixed platform truck with a lift platform type; or a low-lift fork truck with a high-lift tiering truck, or a ram truck with a crane truck, or a tractor with any of these. Thus, any study of the costs of operation must be predicated upon two separate avenues of approach; 1—the analysis of the work to be done, and 2—the analysis of the capabilities of a particular piece of handling equipment to do that work economically.

This discussion will be limited to an attempt to show what some of the principal factors are which enter into both approaches to the problem, and will not be an attempt to formulate a model for case study analysis. Nevertheless it is believed that a consideration of these factors will enable the reader to make his own studies with some degree of assurance that he will not neglect any essential elements.

The Work to Be Done

A large number of investigations have been made in various industries with regard to the amount of handling required to produce a given volume of product. These investigations have yielded many diverse figures, as was to have been expected, because local conditions always affect the results. But some very broad conclusions may reasonably be drawn, indicating that handling ratios usually fall within fairly well-determined bounds. To anyone who has not given this subject a great deal of thought the accompanying table below may be somewhat of a shock, since it indicates what a large proportion of productive effort is absorbed in handling.

In foundry work, very nearly 100 per cent of the labor payroll is for handling; and a ton of sand may be handled as many as 70 times or more per ton of finished castings produced. (An analysis of handling in a typical malleable foundry will be included in this series later.) The point to be emphasized here is that in *every* industrial enterprise handling is an important item of costs, and that it is a non-productive item of costs; so that the lower these costs may be cut on every handling operation that is

TONS HANDLED PER TON OF OUTPUT	TYPE OF WORK OR INDUSTRY INVESTIGATED
2 to 4	L.c.l. railroad freight; marine freight.
3 to 10	Blast furnace; rolling mill; forge shop; glass making; sugar refining; heavy chemicals; canning; box-making; printing; brick and clay products; general warehousing.
5 to 25	Production machine shop; automotive assembling; electrical products; leather; rubber; paper; wall-board; textiles; flour milling; meat packing; lumber and wood-working; tin plate and sheet mills; rod and strip mills; hardware.
15 to 30	Most assembly plants; job machine shops; die-casting; railroad repair shops; marine construction yards.
50 to 150	Foundries other than malleable.
100 to 200	Malleable foundries.

By FRANCIS JURASCHEK
Consulting Editor, The Iron Age

Industrial Truck Operation

absolutely necessary, and the more unnecessary handling operations are eliminated the greater will be the effect upon production costs as a whole.

Here is the first clue to the analysis; how much of the handling is absolutely necessary? Surprising results have been obtained from studies of flow sheets of production, particularly in plants which have grown somewhat haphazardly over a period of years. The proper way to study this subject is to forget for the moment the actual plant layout, and to make up an ideal flow diagram. This ideal diagram will sometimes look nothing like a plant layout, but it will have the advantage of putting successive operations in their proper relationship to each other. An example of such an ideal diagram is shown in Fig. 1, where the major operations in a malleable foundry are flow-charted. Now, by comparison with an actual malleable foundry floor layout, upon which the movements of materials of the ideal diagram are plotted, a picture of the handling operation will be obtained which inevitably reveals any unnecessary movements. This picture may be termed a "qualitative" analysis of the operations. To evaluate it in terms of costs it is necessary to make a parallel "quantitative" analysis.

For this purpose assume, for example, one ton of finished product at the end of the line, ready to be shipped out of the plant. Trace this finished product back through every operation, to the raw materials entering the plant, and between each operation to which these raw materials are subjected to bring them to the finished state, set down, in tabular form, as nearly as can be determined,

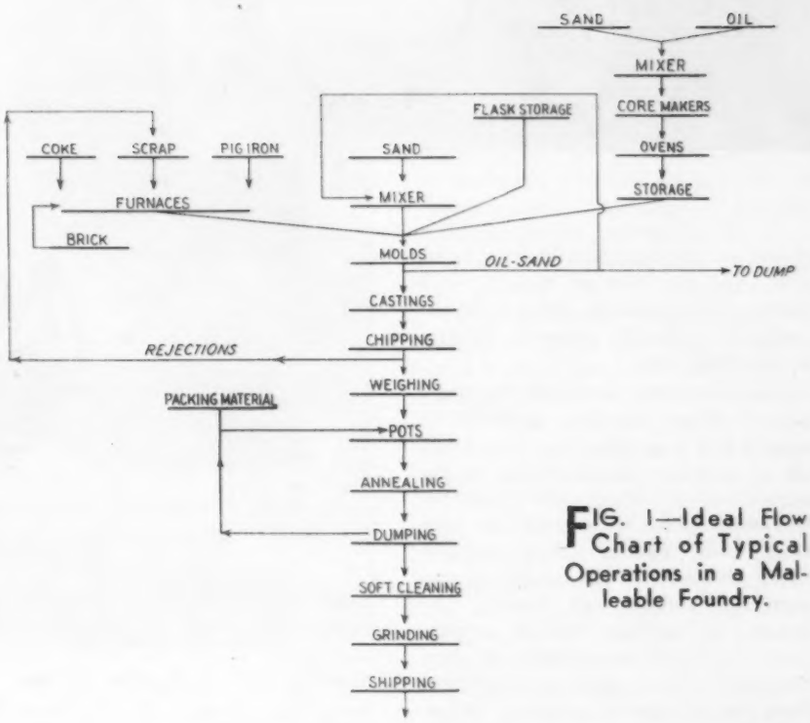


FIG. 1—Ideal Flow Chart of Typical Operations in a Malleable Foundry.

three facts; the *weight* of materials or parts or product handled between one operation and the next, the *distance* over which that weight must be handled, and the *cost* of that handling. Finally, it is well also to determine, or to estimate, the *number of times* per average day each particular handling so listed is performed.

Here are the raw facts on which any study of a handling problem must be based:

1—The ideal flow chart of operational sequences.
2—The actual plant layout, with handling operations plotted thereon.
3—The handling operation described, step by step.
4—The weight of materials handled between each production operation.
5—The distance this weight is handled between each production operation.
6—The cost of handling the weight over this distance.
7—The number of times per average working day this handling must be done.

With these raw facts at hand, *before* any consideration of new mechanical handling equipment is permitted to enter the problem, study one point with care: Is it possible, by rearranging the location on the plant layout of process or production equipment, to cut down the handling distances, or to eliminate certain movements to and fro, by making the actual plant layout conform more

FIG. 2—An Elwell-Parker storage battery truck particularly adapted for tiering work.

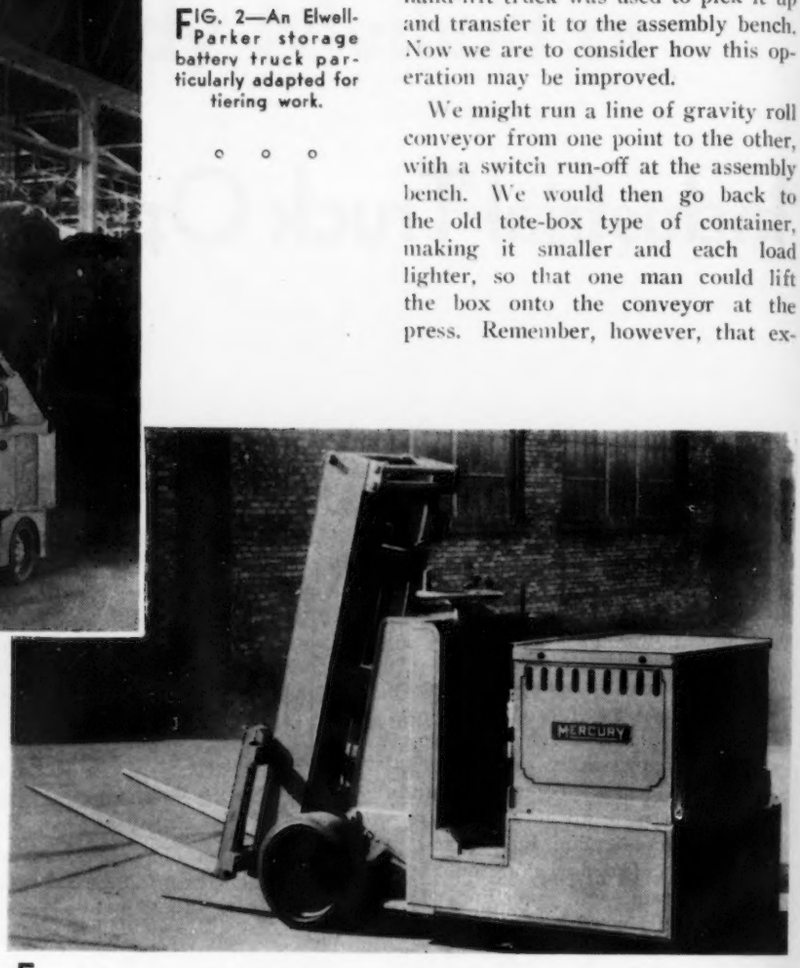


FIG. 3—A Mercury center control chisel fork tilting lift truck for pallet handling.

closely to the ideal flow chart? If so, what will the cost of making such changes in equipment location be, as compared with the probable savings in handling costs?

Then, *and only then*, can the question of other handling methods be approached logically; for it should not be assumed that a change in the method of handling will yield the maximum possible savings in handling costs, applied to a situation which is basically susceptible of improvement without such change. Any change in handling method presupposes a capital investment in new equipment, which must be amortized from the savings it produces before it can show a real operating profit. If that investment be made under conditions which permit of such amortization in less time because of an improved set of operating conditions, it is sheer nonsense normally to make the investment in a new method without at the same time taking every possible advantage of the conditions under which that method must operate.

The Method to be Used

Up to this point, the study has been concerned with facts-as-they-are; from now on, they will be concerned with facts-as-they-might-be. It starts on this new tack with a second review of the raw data gathered in chart, layout and tabular form as indicated above, but with this difference; now these details are to be studied from a new viewpoint: Is there a *better* way of doing it? And here the field is wide open for the consideration of all types of mechanical handling equipment.

Suppose, for example, that the particular step under consideration is the moving of about 300 pounds of metal stampings 10 times a day from a stamping press to an assembly bench about 50 feet away. At the press the stampings now fall into a tote-box. Years ago an ordinary tote-box would have been lifted (by two men) onto a hand truck, pulled to the assembly bench, and there, either left on the floor so that the assembly operator had to stoop down and pick up each stamping as he needed it, or the box would have been lifted (again by two men) to a table. Then a new method was introduced. The tote-box was furnished with legs, forming what is known as a "dead skid-box," and a hand-lift truck was used to pick it up and transfer it to the assembly bench. Now we are to consider how this operation may be improved.

We might run a line of gravity roll conveyor from one point to the other, with a switch run-off at the assembly bench. We would then go back to the old tote-box type of container, making it smaller and each load lighter, so that one man could lift the box onto the conveyor at the press. Remember, however, that experience has shown that to work to the best advantage, loads from 150 to 200 pounds should seldom be lifted above knee-height; that loads from 75 to 100 pounds not over waist-high; and loads from 25 to 35 pounds not over shoulder-high. Shall we use tote-boxes (or tote-pans) holding only 100 pounds of material, since the conveyor is waist-high?

We might put in an overhead track and use trolleys from which a sling depends which will engage the tote-pan. Then we must consider these questions: Shall we push the trolleys by hand, or use an electrically operated system, or trolleys disposed at regular intervals along a power-driven chain?

Shall we use wheeled skid-boxes ("live" skids) and haul them by a tractor, or shall we retain the dead skid-boxes and pick them up and

carry them with a high-lift platform industrial truck which will deposit them at the end of the trip directly on the assembly bench?

Right here we begin to realize the folly of attempting any study based on one operation alone. For the cost of installing mechanical handling equipment to perform this single operation would be prohibitive, in terms of the returns. Many handling operations must be considered together, and a type of handling equipment selected which is adequate to serve all, or a majority of them, adequately and at the same time, economically, to warrant the cost of the change from any present method. Let us, therefore, on the basis of the raw facts previously assembled, try an analysis of one particular type of equipment (the industrial truck) as applied to the work of the whole plant, or a major department thereof to see how it may fit into all the conditions encountered.

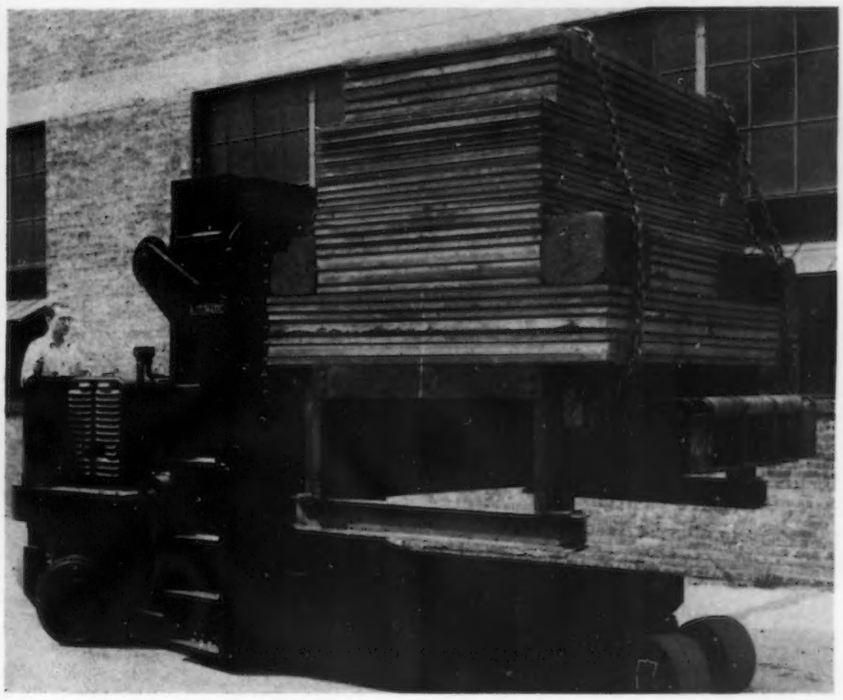


FIG. 4—An Automatic high-lift platform truck powered with Ready-Power gasoline-electric unit.

Industrial Truck Analysis

Usually a quick survey of the various handling operations will show that one particular type of industrial truck will suit a majority of the needs very well. Where skid-loads must be transferred, the lift platform type may be indicated; where pallet-loads, or crates, or heavy single parts of substantial bulk for the loads, the fork truck may be used; where coils or hollow rolls of material are to be handled, the ram truck is suitable; where shapes are bulky and unwieldy the crane truck is a possibility. Or, two or more types of trucks may have to be considered.

To make comparisons possible, it is necessary first to gain some conception of the cost of truck operation per hour of use. For purposes of rough estimating (to be checked later by actual working data) four approximations are in fairly general use among truck manufacturers:

1—The electric truck, being driven by a series wound direct current motor, has a speed of travel varying with the load, the grade, and the power equipment used. Roughly, average speeds may be taken as follows:

Level operation, no load
400-500 ft. per min.
Level operation, 3-ton load
300-400 ft. per min.
Level operation, 5-ton load
250-300 ft. per min.

For each 1 per cent of grade, up to 8 per cent, subtract 10 per cent of above speeds. To change ft. per min. to miles per hr., divide by 88.

2—Current consumption is based on tractive effort. Tractive effort may be estimated roughly as 2 per cent of the gross load in tons on level runs, and 1 per cent additional for each 1 per cent of grade. Then, current consumption is roughly equivalent, in watt-hours, to 0.6 x tractive effort, per 1000 ft. of travel. For lifting purposes the current consumption may be roughly estimated as foot-pounds divided by 1300.

3—Power costs in dollars per year for the storage battery truck will be fairly close to 11 times the kilowatt-hour capacity of the battery, assuming the cost of power to be about 1½ cents per kw.-hr. The truck itself is depreciated over a 10-year period, and maintenance is taken at 5 per cent of the purchase price.

4—Straight gasoline engine pow-

FIG. 5—A Clark 3-ton telescoping, tilting fork-lift tructier; a compact combination lifting, carrying and tiering unit.

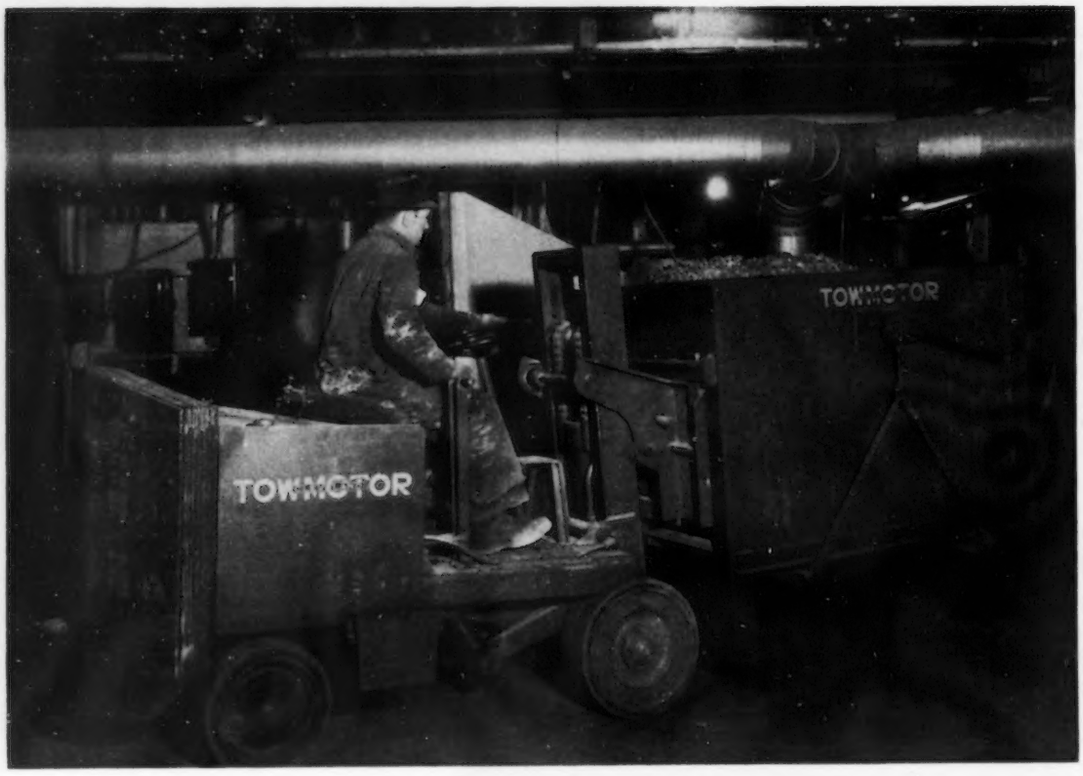


FIG. 6—This Towmotor tractor has a special grab which lifts and carries a bin of glass-making refuse.

ered trucks, or trucks powered with Ready Power gasoline-electric units may be estimated as taking five gallons of gasoline and one quart of lubricating oil per eight-hour shift; and such trucks are usually depreciated over a 7-year period, with maintenance taken at 10 per cent of the first cost.

Going back to our assemblage of raw facts on the handling operations in the plant, we first study loads, times and distances, and frequency of operations. Perhaps several loads can be combined into one for truck operation, thus cutting down the number of trips. Can a schedule be worked out so that a truck may make definite rounds, moving fairly large loads from one point to another in advance of the actual requirements at each new point? Here we are working to establish an idea of maximum loads, necessary delivery times, and total truck working time each day. Add to this an examination of floor surfaces with regard to traffic conditions and the grades of the ramps, if any.

At this point it is possible to figure a definite type and size of truck to meet the handling needs and the power requirements. Following this operating costs may be estimated with a fair degree of accuracy. Assume, for the moment, that a medium lift fork truck is being considered, powered with a 15 cell MVM-19 Exide Ironclad battery; that the purchase price of the truck is $2,350.00 and of the batteries, $440.00.

Truck depreciation per year is figured on the cost of the truck less the cost of the tires, over a 10-year period; the tires, costing $100.00 per set are figured for renewal every year. Battery depreciation is figured over a four-year life, and battery charging equipment depreciation should be taken at 5 per cent annually on an initial expense of $500.00, pro-rated to each truck used. In this case, for a single truck, the entire depreciation should be charged against it. Interest on the investment, at 6 per cent, is taken in our estimate at 3 per cent, because each item is amortized by a depreciation figure each year.

More exact power costs than given by the approximation above may be estimated by multiplying together the kw.-hr. capacity, the cost of power per kw.-hr. and the number of days per year during which the truck will be used, and dividing the result by the product of the battery charger efficiency and the efficiency of the battery. Expressed as a formula, when P equals power cost per year of use.

$$P = \frac{\text{Battery kw.-hr. x power cost per kw.-hr. x days use per year}}{\text{Charger efficiency x battery efficiency}}$$

For the particular type of truck under consideration, the operating costs may then be estimated as in the following tabulation:

TYPICAL TRUCK OPERATING ESTIMATE

1—Cost of truck delivered.	$2,350.00
2—Cost of tires per set...	100.00
3—Depreciation per year on truck less tires, @ 10%	225.00
4—Estimated annual tire cost (one set per year)	
5—Depreciation per year on battery (25% of $440.00)	110.00
6—Depreciation per year on charger (5% of $500.00)	25.00
7—Annual Maintenance, @ 5% of original truck cost	117.50
8—Interest @ 3% on items of original cost $3,290.00	98.70
9—Annual power cost, complete charge each day, 300 days	100.00
10—Annual operating cost, sum of items, 3 to 9 inclusive	776.20
11—Average daily operating cost, item 10 divided by 300	2.587
12—Average hourly operating cost, item 11 divided by 8.....	.323

That is, 32 1/3 cents an hour will

be an approximate estimate of the operating cost of the truck being considered. Now this figure cannot apply directly to the cost of any particular handling job, for it assumes that the truck will be in constant use, 8 hours per day, 300 days per year. In order to determine how much work a truck will actually do in a day's time, it is necessary to include a factor in the calculations to compensate for delays or idle time of any nature. This factor will depend upon the nature of the business, the type of materials handled, the type of truck used, the length of haul, and other contributing items. Obviously, the shorter the haul, the greater this factor will become, since the more time will be consumed at the loading and unloading points. For average work this factor will probably be not less than 1.5 nor more than 2.5; which means that actual operating costs of the truck on any particular job may range from 48 cents to 80 cents an hour.

To this should be added the wages of the operator—for a truck is not an automatic robot. This item will undoubtedly be between 60 and 75 cents an hour; affected likewise for any particular job by the idle-service factor used. So, it is not unreasonable to take some such figure as $1.50 an hour of *actual working time* to represent the cost of handling, truck and operator included. (It will be noticed that about 1/3 of this figure is truck cost, and 2/3 operator's wages. This proportion is fairly general for practically all types of industrial truck operations.)

Cost of Handling Material

Now we have a basis for working out handling cost estimates. Having an approximate operating cost, calculate roughly the cost of handling the various weights of load over the various distances between point and point on the plant layout, and tabulate the results for a typical day's operation. This will give a figure for direct handling costs which may be compared safely with present costs, and will be about as close as estimates may be made, considering the fact that there are so many variable elements entering into the problem of actual work.

Such a study takes time and effort, and costs money. It is rarely made completely, for the simple reason that in most cases of a comparison between hand handling and industrial truck handling a few quick parallels may be drawn between the total payroll costs of the one method and the estimated operating costs of the other, showing such marked advantages for the mechanical handling method that the average plant executive will accept them without further ado. And, let it be said that actual cost comparisons made on the basis of work done later so uniformly substantiate his conclusions that he feels it unnecessary to go into the detail as to why it should be so.

Where the study is made completely it is usually in conjunction with a general program of modernization of an old plant, or in laying out a new plant, or in considering the costs of more than one type of mechanical handling equipment. However, whenever and wherever a complete study has been made, several indirect benefits have resulted, in addition to the positive knowledge gained of the actual costs of handling. Some of these indirect benefits may be summarized thus:

1—The gaining of a clearer conception of the importance of coordinating all processes within the plant, and of the actual relationships between processes.

2—The gaining of a clearer conception of the non-productive values of all handling work whatsoever, and of the need to cut these values to the bone.

3—The gaining of a clearer conception of ways and means of utilizing process or production equipment nearer to its actual capacity.

4—The gaining of a clearer conception of a method of plant operation with less money tied up in inventories of partially finished product.

5—The gaining of a clearer conception, in short, of the inherent efficiency of straight-line production on a continuous-flow basis.

No more pertinent example of these indirect benefits realized can be cited than the automotive industry. There the *organization* of materials handling has probably done as much to make it possible to turn out quality products at reasonable cost as all other factors combined. This organization has not been a haphazard one. Constant study has been found necessary; and the continual analyses of handling costs at every step of the way have shown how non-productive efforts could be reduced to a minimum. Likewise such analyses have shown the way to formulating methods for the coordination of processes, so that maximum efficiency is obtainable in every production operation.

To make a case study of materials handling operations is, then, a first and most logical step toward getting such a grasp of the operational functions of any industrial work as will make it possible intelligently to effect substantial reductions in overall production costs.

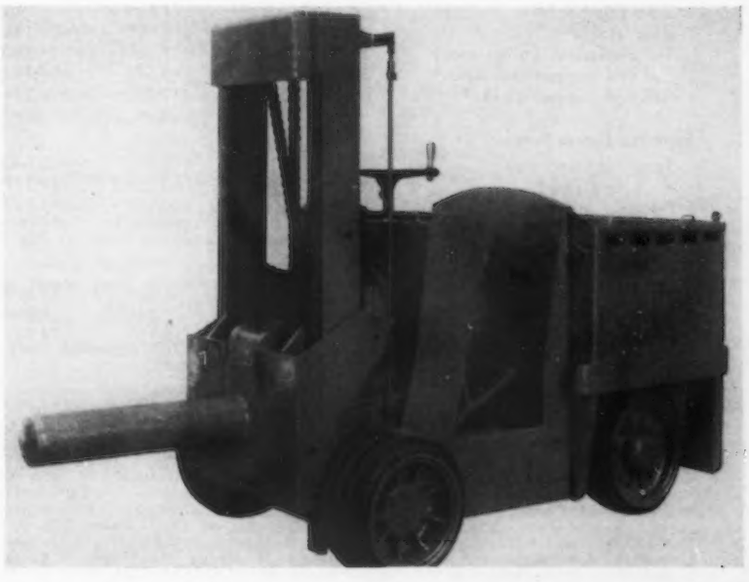


FIG. 7—A powerful Yale ram truck for coiled strip handling, with articulated body.

Current Metal Working Activity

Latest Data Assembled by THE IRON AGE from Recognized Sources

	March 1938	February 1938	March 1937	Three Months 1937	Three Months 1938
Steel Ingots: (gross tons)					
Monthly output[a]	2,011,840	1,703,245	5,216,243	14,354,969	5,447,351
Average weekly output[a]	454,140	425,811	1,177,481	1,116,250	423,589
Per cent of capacity[a]	33.84	31.73	89.90	85.23	31.57
Pig Iron: (gross tons)					
Monthly output[b]	1,452,487	1,298,268	3,459,473	9,670,191	4,179,840
Raw Materials:					
Coke output[c] (net tons)	2,772,371	2,598,186	4,849,363	13,762,576	8,250,131
Lake ore consumed[d] (gross tons)	.....	1,776,585	5,142,496	14,280,114	.....
Castings: (net tons)					
Malleable, production[e]	21,902	19,252	67,559	178,492	60,048
Malleable, orders[e]	20,556	19,557	68,502	182,759	57,189
Steel, production[e]	.....	27,436	111,704	296,106	.....
Steel, orders[e]	.....	30,863	158,284	371,817	.....
Finished Steel: (net tons)					
Trackwork shipments[a]	4,461	3,014	10,720	26,119	10,610
Fabricated shape orders[f]	83,977	54,996	206,321	461,837	218,847
Fabricated shape shipments[f]	100,956	79,568	142,995	345,125	268,287
Fabricated plate orders[e]	38,052	17,827	71,250	145,044	79,031
U. S. Steel Corp. shipments[g]	572,199	474,723	1,414,399	3,698,041	1,565,244
Ohio River steel shipments[h]	91,550	74,612	122,100	306,670	239,412
Fabricated Products:					
Automobile production[i]	238,753	202,872	519,178	1,302,108	669,369
Construction contracts[j]	$226,918‡	$119,038‡	$231,246‡	$662,681	$541,428
Steel barrels shipped[e]	.....	.....	995,407	2,639,435	.....
Steel furniture shipments[c]	.....	$1,673‡	$2,629‡	$7,066‡	.....
Steel boiler orders[e] (sq. ft.)	753,480	435,317	1,585,833	3,102,085	1,690,400
Locomotives ordered[k]	10	17	29	108	36
Freight cars ordered[k]	682	109	6,200	27,613	816
Machine tool index[l]	107.0	75.7	211.6	192.4†	100.4†
Foundry equipment index[m]	114.6	90.4	293.2	244.8†	94.4
Non-Ferrous Metals: (net tons)					
Lead shipments[n]	31,052	30,135	63,425	159,518	96,110
Lead stocks[n]	143,511	138,134	137,204	.....	.....
Zinc shipments[o]	33,528	21,540	59,635	157,815	79,999
Zinc stocks[o]	118,009	108,138	18,183	.....	.....
Tin deliveries[p] (gross tons)	4,555	4,420	9,080	24,370	14,525
Refined copper deliveries[q]	44,576	32,282	98,349	262,626	107,563
Refined copper stocks[q]	342,785	326,244	121,448	.....	.....
Exports: (gross tons)					
Total iron and steel[r]	526,883	460,640	570,551	1,063,228	1,573,817
All rolled steel[r]	160,959	144,379	186,531	412,186	493,371
Finished steel[r]	130,938	113,589	173,428	381,111	391,812
Scrap[r]	334,742	255,627	355,979	631,962	1,065,371
Imports: (gross tons)					
Total iron and steel[r]	11,827	19,589	51,802	135,596	61,047
Pig iron[r]	746	3,354	10,720	34,494	13,847
All rolled steel[r]	8,929	14,885	31,460	79,003	42,231
British Production: (gross tons)					
Pig iron[s]	714,600	693,300	680,300	1,934,700	2,169,000
Steel ingots[s]	1,115,800	1,057,600	1,109,500	3,104,300	3,254,800

† Three months' average. ‡ 000 omitted.

Source of data: [a] American Iron and Steel Institute; [b] THE IRON AGE; [c] Bureau of Mines; [d] Lake Superior Iron Ore Association; [e] Bureau of the Census; [f] American Institute of Steel Construction; [g] United States Steel Corp.; [h] United States Engineer, Pittsburgh; [i] Preliminary figures from Automobile Manufacturers Association—Final figures from Bureau of the Census, U. S. and Canada; [j] F. W. Dodge Corp.—37 Eastern states; [k] *Railway Age;* [l] National Machine Tool Builders Association; [m] Foundry Equipment Manufacturers Association; [n] American Bureau of Metal Statistics; [o] American Zinc Institute, Inc.; [p] New York Commodity Exchange, Inc.; [q] Copper Institute; [r] Department of Commerce; [s] British Iron and Steel Federation.

Ten Years of Steel

o o o

By MYRON C. TAYLOR

o o o

THE record shows that, over the years, after paying the necessary expenses, United States Steel paid out in wages and salaries 84 per cent of the monies that remained with it. But the record covers ten years, and some of them were very bad years—at one point operations dropped to 13.6 per cent of capacity. During the years 1932, 1933 and 1934, the wages and salaries paid exceeded the sum which was left over. The wages in those years were in part paid out of the savings held by United States Steel for the owners—that is, out of earnings that had not been distributed in good years.

In the prosperous year of 1929, wages took 65 per cent of United States Steel's receipts after the payment of necessary expenditures. In 1930 they took 77 per cent and in 1931 they took 93 per cent. In 1935 they took 97 per cent. In 1936 they took 85 per cent and in 1937 they took 80 per cent.

Return to Owners Small

It is apparent that the returns to the owners did not stand in the way of wages, for in some years the owners received little or nothing and the total amount received by them over the ten years was not considerable. The fund was divided 13.6 per cent to the owners and 84 per cent to the wage earners—the rest going for mortgage interest. The cost of government was a more important factor than the returns to the owners.

The taxes paid during this period were $467,000,000. That is, the units

(CONTINUED ON PAGE 73)

HOW WE SECURED OUR FUNDS

Jan. 1, 1928, to Dec. 31, 1937

Cash on hand Dec. 31, 1927			$ 124,424,259.74
RECEIPTS FROM THE FOLLOWING SOURCES:			
Net earned for capital stock in period		$446,555,361.98	
Other net income receipts not earned in period:			
Federal income tax refunds (exclusive of interest on refunds of $25,823,015 which is included in above net profits)		49,084,368.21	
Railroad recapture deposits refunded		6,355,750.25	
Other net operating receipts made available:			
Appropriations from gross earnings for depletion and depreciation reserves	$561,634,952.66		
Less expenditures for replacements charged to depreciation reserves and net drafts on insurance, contingent and other operating reserves for payments and charges in excess of newly created allowances to such reserves from earnings	24,749,840.92		
		536,885,111.14	
Receipts from issuance of common stock:			
From subscriptions by stockholders (81,016,605 shares)	$142,697,624.50		
From subscriptions by employees, (33,974 shares)	5,683,762.00		
In purchase of additional properties, (536,438 shares)	91,570,334.92		
		239,951,721.42	
Net receipts from liquidation of land sales and home owning contracts, etc.		9,738,805.04	
Sundry miscellaneous receipts (net)		6,707,980.03	
Reduction in net liquid assets (other than cash):			
In government and other securities and investments	$127,583,874.76		
In all other liquid assets (less current liabilities)	42,978,234.97		
		170,562,109.73	
			1,465,841,207.80
Total cash resources available			$1,590,265,467.54
PAYMENTS FOR THE FOLLOWING PURPOSES:			
Dividends declared during the period:			
On preferred stock	$252,196,770.00		
On common stock	219,715,683.50		
		$471,912,453.50	
Expended for additions, extensions and betterments of the properties, including mine stripping and development expenditures and advanced royalties paid		567,923,869.73	
Bonds, mortgages and purchase money obligations retired:			
Par of same	$398,835,291.17		
Premium paid in retirement	40,781,204.25		
	$439,616,495.42		
Less bonds and mortgages issued	26,209,249.98		
		413,407,245.44	
Acquirement of properties of Atlas, Columbia Steel and Oil Well Supply Companies:			
Fixed property acquired	$ 50,519,536.54		
Other assets (less liabilities assumed)	41,050,798.38		
		91,570,334.92	
Total payments in the period			1,544,813,903.59
Cash on hand Dec. 31, 1937, per consolidated balance sheet			$ 45,451,563.95

. . . . THIS WEEK ON THE

Auto production slumps to 57,555 as Chevrolet closes all plants for week . . . 1939 model program well underway with minor changes indicated . . . Gar Wood announces profit sharing plan ending two-day strike . . . Four-way split shows up in UAW.

DETROIT—Best indications of the prospects for the automobile industry come from a study of present activity. Without doubt the automobile plants have passed their peak of first half production and are on the downgrade, perhaps more quickly than has generally been realized. Only two weeks ago the total output reached 62,021 passenger cars and trucks, a noticeable increase over the first week in April. Since then the downward trend has been apparent. From the 62,000 mark, the total slid to 60,563 one week ago. Last week the figure slumped to 50,755, compared with 141,485 for the corresponding period a year ago, according to Ward's Automotive Reports. This puts the auto industry's operating rate at only 35 per cent of last year's level.

A shutdown of all the Chevrolet plants was the prime factor of the reduction, and at the same time illustrates very well what is almost a general condition in the industry. The Chevrolet shutdown which hit at Flint, Monday night and in all the other Chevrolet plants Tuesday morning is attributed to general business conditions, although resumption of Chevrolet operation is expected this week.

The cut in Chevrolet production last week reduced General Motors total to 14,670 units, compared with 23,710 the previous week. Chrysler slipped down 500 units to 13,050, Ford declined 300 units to 15,785.

Ford May Shut Down

While denials have been issued, there are indications that the Ford Rouge plant will be virtually shut down in a short time. This may give production another blow. Employment at the Rouge has fluctuated widely since the end of March when it was 43,000. In the last week of that month 20,000 men were laid off but at the end of April the number had increased to 39,000.

Automobile sales showed only a moderate improvement in April after a serious setback in the initial 10-day period of the month when bad weather swept the country.

Only a very minor improvement is shown by production totals for April, compared with March. Then the industry turned out 238,756 units and during April probably went as high as 240,000 units. This is far below the total of 553,415 for April last year. Ward's Reports comments that the gap existing month by month between this year and 1937 is steadily widening.

1939 Model Changes

Plans for 1939 models have definitely shaped up in the majority of cases and have progressed to the point where there is no possible side-stepping and no further changes are likely. Clearest in the picture are General Motors and Chrysler, while Ford temporarily has become an uncertain factor. It is understood that after Henry Ford returned from Georgia a few weeks ago he turned thumbs down on the two new models that were projected for next year. Speculation concerning the small car which was being built experimentally hints that excessive cost of constructing the body with an integral frame was a factor in the reported decision to cancel plans for that type car. However, Ford, with the facilities he has at his command, may conquer this problem. In fact, considerable Ford die work is still being done. Whatever program is followed by Ford body designers, it seems certain that the small power plant, axle and driving mechanism will be carried out in some form or other.

Perhaps all the rumors about Ford's canceling plans for the small car are dreams of others in the automobile business; certainly they don't seem characteristic of Ford himself. Much more likely is the prospect that the new light car with the four cylinder engine will be ready for preview in July on Henry Ford's 75th birthday, and a lot of Detroiters are looking forward to seeing this come to pass.

At the time the equipment program was active for the smaller Ford power plant, everything was labeled "tractor." The tractor, despite all that has been written about it, even despite the pictures that have been published, still is far from commercial production. Parts for only three have been made up, and it is pretty definitely reported that the original tractors used a regular V-8 engine. Until there are further developments, you can write it down that Henry Ford holds all the secrets.

General Motors, despite retrenchment as regards new models, still has quite a program underway. Buick is going ahead with work on a Zephyr-like automobile. Chevrolet will extend the radiator grille a few inches further forward and slightly change other details of appearance.

In addition, Chevrolet is sponsoring one of the few important mechanical changes for next year, although it is not striking out in any original design venture. The knee-action suspension of the front wheels is to be changed from the present enclosed coil-and-shock-absorber type to an open coil type, similar to that used by Buick, although conventional leaf springs will continue to be used in the rear on the Chevrolet.

This change was contemplated several years ago in Chevrolet, but because of the huge plant investment, it

ASSEMBLY LINE . . . .

By W. F. SHERMAN
Detroit Editor

was deemed inadvisable at the time. The new design does not indicate any particular dissatisfaction with the older type, except that it is desirable only for the lighter cars, and as the years have passed, Chevrolet has outgrown that classification. It was cheerful news to machinery builders when Chevrolet made the decision to change, because in the last 30 days it has meant heavy expenditures for new equipment.

Other General Motors units that have minor programs underway are Pontiac and Olds, which are eliminating the eight cylinder cars from their line and making minor changes on the sixes; LaSalle will get a new engine along with other changes in 1939, while Cadillac which "got a new deal" this year, will get only minor changes this coming year.

Chrysler changes will be mostly like those contemplated by the majority of the General Motors units and will, therefore, be limited mostly to sheet metal and appearance changes. Work on Dodge and Plymouth instrument panels and other small stamping dies is already underway.

Much of the old Highland Park plant of the Ford Motor Co. may soon revert to that company, if Briggs Mfg. Co. goes through with contemplated plans which call for closing up about half of the area now rented from Ford to do Ford work. Sharp reduction in daily shipments of bodies to the Rouge is an important factor in this, as is the prospect that Briggs will have little Ford business when the Rouge stamping plant is completed. Operation of Ford's own body factory is hardly likely, however, before the start of 1940 production.

Steel Buying at Low Level

Reports from the steel suppliers in the Detroit area are mixed in tone, with the majority reporting business continuing at a low level. However, one of the major companies declares that in April it experienced its best month since November. March was recorded as the low point, so the upturn for this particular concern was unusually sharp. Light automotive buying and miscellaneous small structural tonnages accounted for the improvement, it was declared. At present the automobile companies are making their last buys of the current model year, with Chevrolet and Fisher Body reported in the market during the last week for moderate tonnages.

Gar Wood to Share Profits

Nationwide attention focused last week on action of Gar Wood Industries, Inc., which announced a plan under which employees will share in the company's profits. Gar Wood, speedboat king, by his own action, takes a 50 per cent reduction in his salary, coincidental with the beginning of the new plan which will give employees 20 per cent of all declared dividends.

At the same time, the UAW union local in the plants in Detroit and Highland Park voted 500 to 12 to accept an agreement which ended a two-day strike. The company has been operating without a union contract since last September, but negotiations started immediately and should be completed by the end of this week. Under the agreement a straight piece work system will be substituted for the Badeaux system under which a quota is set up for group work. The agreement with the union applies only to the local plants, but the profit-sharing plan applies to all Gar Wood employees.

Labor Split Widens

Last week, shortly after the Ford Brotherhood of America announced its request for a $1,500 annual wage, it became involved with the NLRB over whether the brotherhood had already been defined as an employer-controlled organization, or whether it had been recognized by the board as a legitimate labor organization.

The long-expected outbreak of hostilities within the UAW came recently in a form that may cause John L. Lewis, CIO head, to take sides in an effort to settle the dispute. Threats of dissolution of the partnership of Homer Martin and Richard Frankensteen which has ruled the union for the last two years were seen in the events that followed heated displays of factionalism a week ago at the first statewide CIO convention. The argument appeared to have reached a climax when 200 Martin supporters left the Lansing hall in an open split with the other 600 delegates.

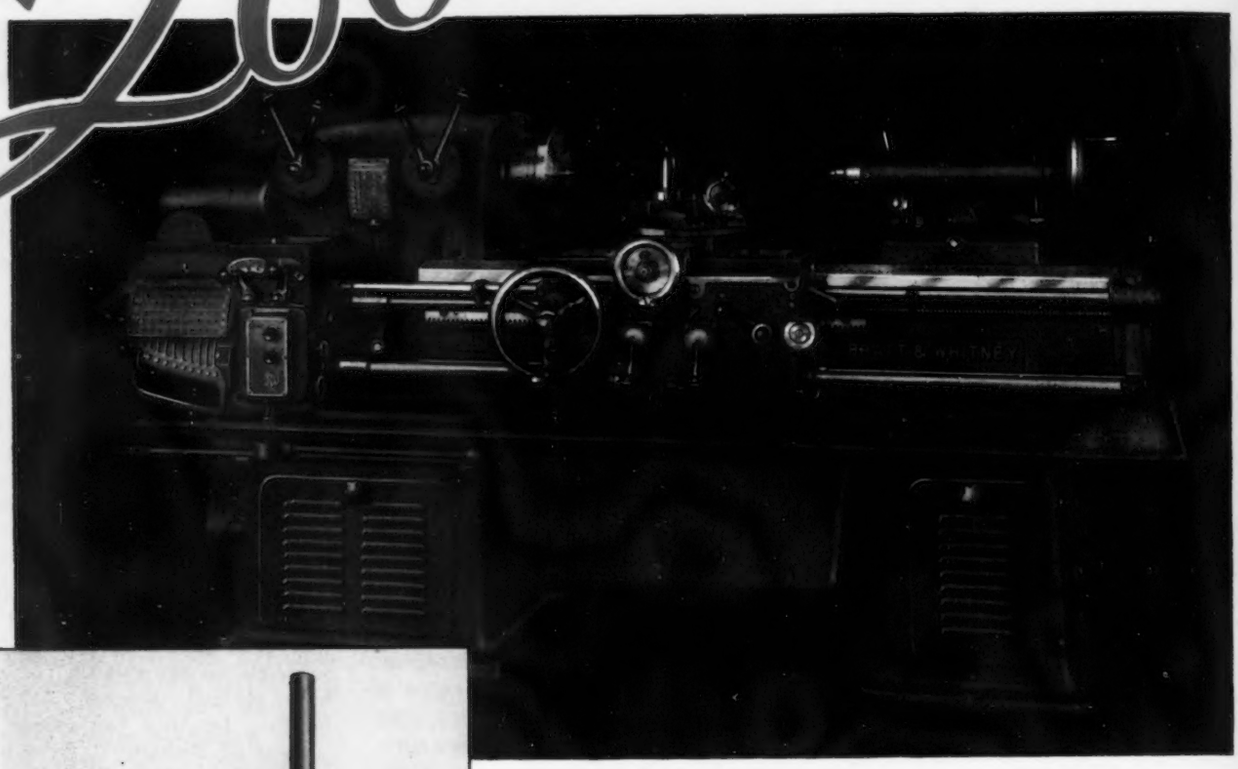
This split between Martin's "progressive" faction and the more radical "unity" group in the union has been known for a long time and was marked by conflict at the Milwaukee convention last fall. But the state convention and its aftermaths revealed splits in each of the two original factions.

The two-day battle brought to light an argument between communistic elements in the "unity" group and socialists. The quarrel revolved about the socialists' charge that the communists had pledged support to Victor Reuther, but then had swung to the support of Richard T. Leonard, Detroit UAW welfare director, for secretary-treasurer. Leonard won the election 414 to 185.

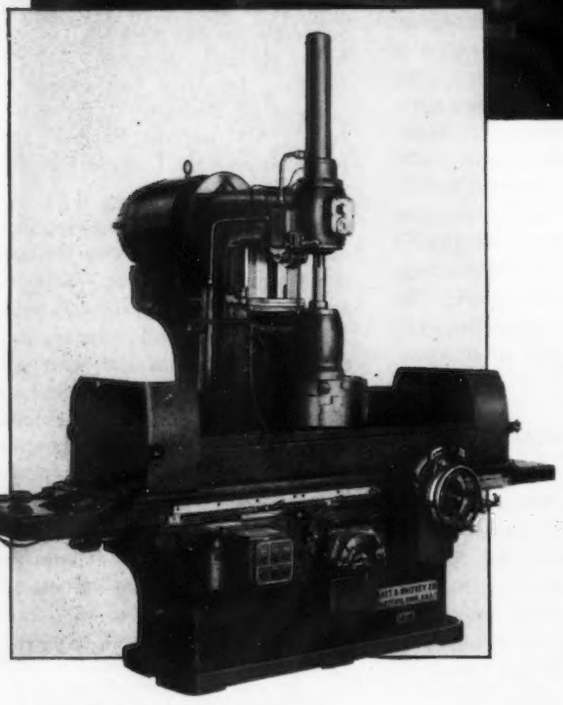
A day or so later Frankensteen sent out letters to members of the international union's executive board proposing a 14-point program for harmony. He would outlaw all caucuses and special groups within the international, with a threat of discipline for anyone who failed to abide by the harmony program or who spread rumors about officers. Martin brought the argument into the open with a public blast which said, "Certain forces within the union have failed in their frontal attack against the leadership of the UAW and are now seeking to enter the rear door disguised as a faction to end factionalism."

Whether John L. Lewis will support Frankensteen in his break with Martin is uncertain. However, John Brophy, Lewis' aide, read a strict lecture at the State convention calling for an end to factionalism.

Toolroom



Toolroom Lathes



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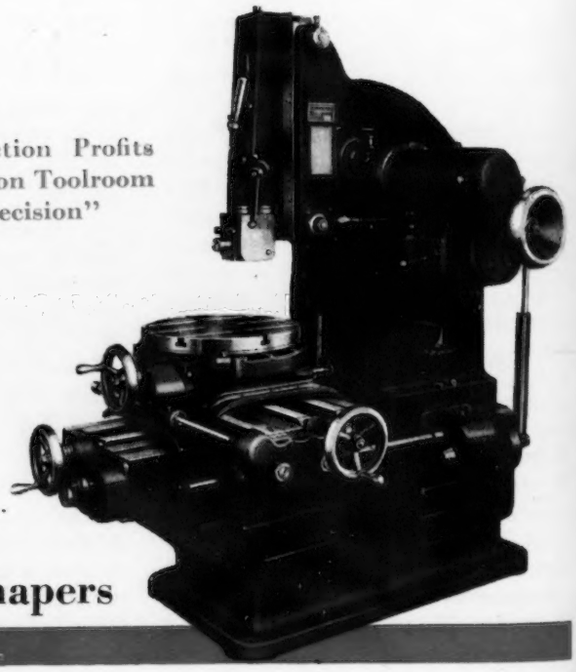

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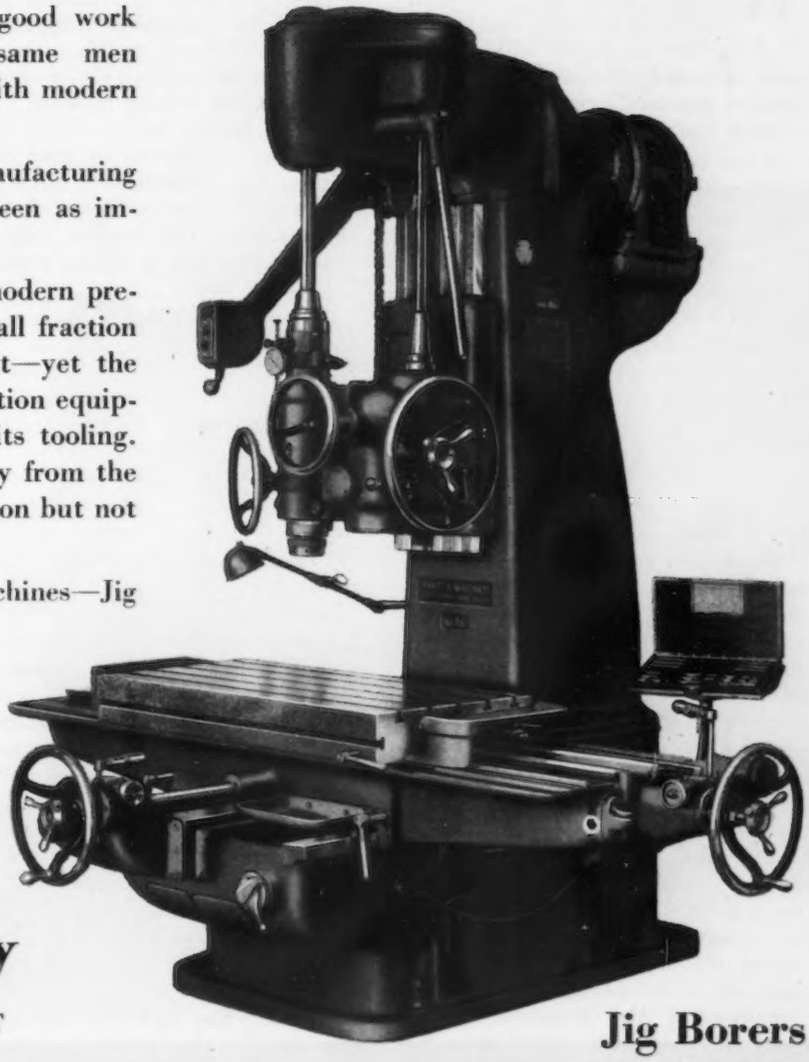

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THIS WEEK IN WASHINGTON

. . . Silence indicates Ford left White House "uncharmed" by effort to win his support for New Deal economics . . . Labor Board moves hastily to repair holes left by court's "fairplay" decision . . . Opponents again block Roosevelt's demand for wage-hour legislation . . . President wants identical bids made prima facie evidence of price fixing.

By L. W. MOFFETT
Resident Washington Editor
The Iron Age

o o o

WASHINGTON.—The White House conference between President Roosevelt and Henry Ford has left the public with just as much knowledge of what transpired between the two men as though the meeting had never been held.

It can be safely said that the wide disagreement on economic and social views between the two men was not narrowed in the least by views they exchanged in the Lincoln study of the Executive Mansion. Indeed, the breach may have been widened if the correct interpretation has been made of Ford's cryptic remark in New York on the day following his call on the President that the people of the United States have a leader who is "putting something over on them." Mr. Ford left to the imagination the leader he had in mind.

The society columns no doubt could truthfully say of the White House chat that Mr. Roosevelt was a hospitable luncheon host and that Mr. Ford was an agreeable guest. But, reduced to the crudity of materialism, the conference "was not a success." On that basis the President may be said to have suffered a defeat.

If it were the purpose of the White House in its move for more Government-business cooperation to win over Mr. Ford, the original NRA holdout, the objective was not accomplished. It is evident that Ford left the White House, the only time he has passed in and out of its portals since the incumbency of Mr. Roosevelt, in the same frame of mind—if not more intense in his convictions—as he was in before he accepted the President's invitation, extended through G. Hall Roosevelt, the President's brother-in-law.

Plainly the White House was displeased that Mr. Ford did not join the pledge of 16 prominent business men to cooperate with the Administration to fight the depression. Apparently Mr. Ford adhered to his statement made when he accepted the invitation, that he wanted nothing from the President and had no advice to give him, though he is reported to have made clear to Gov. Marriner S. Eccles of the Federal Reserve Board that he was opposed to the spending program. And this was only a report, probably an accurate one.

Everything was only a report so far as the Washington setting was concerned. This was due to the sphinx-like attitude of both the White House and the Ford party, which in addition to Ford senior included his son Edsel and William J. Cameron, Ford publicity representative. Questions directed at the Ford party by a large corps of news correspondents went unanswered.

Effort to get a statement from the White House drew from Stephen T. Early, secretary to the President, the barren observation that "there will be no statement now or later concerning the conference." The very silence in Washington drew the implication that the President and Mr. Ford broke bread in vain, except for the social amenities the occasion afforded.

No matter what the approach was the Ford party would make no comment at the White House. Even subjects that probably were not discussed at the conference were given the silent treatment. The IRON AGE confronted this attitude when inquiry was made of Mr. Cameron what the present plans are with respect to Ford's $40,000,000 revamping program, which provides for steel plant improvement.

On the train en route to New York from Washington Mr. Ford, relieved of any ethical restriction he might have felt in the White House atmosphere, opened up briefly to two Washington correspondents of Detroit papers. His remarks really were only a restatement of views he has long held and were significant chiefly because of their sequence—following as they did the White House conference. Mr. Ford was quoted as saying: "If finance would get out of Government and Government would get out of business everything would go again." What of the annual wage idea? "You can't have an annual wage until you have an annual business," reflected Mr. Ford.

A crack was taken at planned economy, the suggestion made that "if the Government will just get out of the way and give natural American enterprise a free swing it will do the job," and as to unionization Ford said his employees "don't seem to be interested in it."

Roosevelt Accepts Business Aid

The Administration, the ship of state floundering in the sea of depression, has apparently declared an indefinite moratorium in its epithetical barrage against business leaders, and again has raised the signal of distress, seeking recovery rescue through their craftsmanship. The resulting pledge by 16 outstanding business leaders was a source of gratification to the Administration. The President said the pledge was "excellent"—as it is. Yet it is only a restatement of the natural position that always has been taken by all legitimate business.

Analyzed, the pledge really calls for cooperation and that means that the Administration as well as business must do its part. To this end the pledge is based on sound premises, which are made antecedent to the desired cooperation. They pointedly assume that the President "recognizes that we live under an industrial system in which there must be full opportunity for legitimate profits." The declaration is made that "It seems to us most important that we should resolve to encourage the President in every effort he shall make to restore

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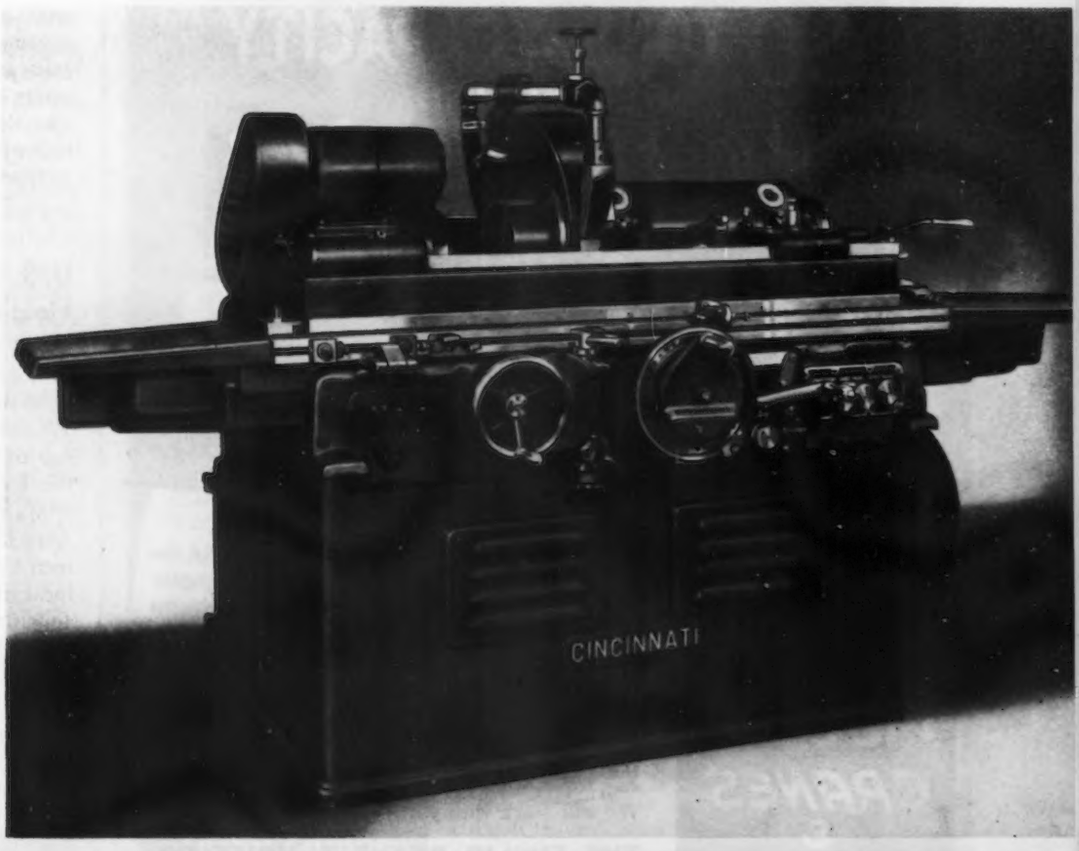

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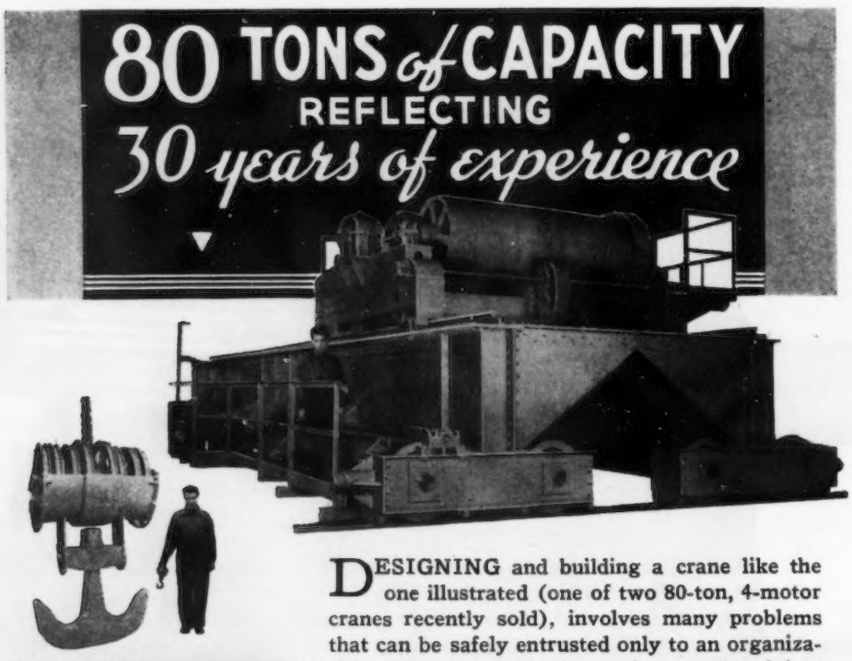

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confidence and normal business conditions and to support Congress in the position that its legislative program should be directed for national recovery for employer and employee alike rather than toward enactment of legislation based on untried social and economic theories."

The statement was brought forth at the earnest behest of John W. Hanes, recently appointed member of the Securities and Exchange Commission. The hope is that the Administration will join business in the spirit of co-operation and consultation offered and will fairly give and not simply unfairly ask.

Bubbling over the proposal, Secretary of Commerce Roper said the 16 business leaders should be called into conference as soon as possible to draft a recovery program.

"Here we have a gesture," said the Secretary, "now let's do something about it."

But, untrue, said President Roosevelt, is the report that he is considering setting up an "inner council" of business men to consult with him and make recommendations regarding solution of economic problems.

Nevertheless just before he left Washington for a sea trip, the President addressed a statement to Mr. Hanes asking the latter to thank the 16 industrialists, bankers and insurance executives for their "excellent statement" and said that he would welcome specific suggestions, either as a group or individually, to aid recovery. The President told Mr. Hanes that "it is mainly a question of finding the methods."

U. S. Chamber of Commerce Holding Annual Gathering

WASHINGTON. — Representatives of nearly one million business men assembled this week at Washington for the 26th annual meeting of the Chamber of Commerce of the United States.

Major problems facing the country were to be considered by 2500 spokesmen for 1500 trade associations and local chambers of commerce during four days of discussion. The program aimed to combat the depression and to promote national progress through the traditional American business system.

Among the subjects scheduled for examination are the effects of the crushing burden of taxation on business and employment; public spending and the new "pump-priming" program, versus private spending in job-making enterprises; unemployment and labor relations.

Supreme Court Warns of "Unfair" Federal Agencies

WASHINGTON.—For the second time in 10 months, the militant anti-wage-hour bloc in the House Rules Committee has squashed Administration demands for a wage and hour bill, refusing to give the measure the right-of-way to the House floor. This action, which threw minimum wage advocates for a fatal loss unless they can muster signatures from 218 House members within the next week, was a highlight on the week's developments on the labor front.

Contributing to the committee's attitude just as it did in 1937 was the AFL-CIO split on the acceptable type of legislation. The bill, approved by a 14 to 4 vote in the House Labor Committee, had the support of both labor factions but committee members and other Congressional members learned from federation literature that had Congress passed previous wage-hour legislation supported by the CIO, "a great injury would have been done the working people of the United States."

No Southern Differential

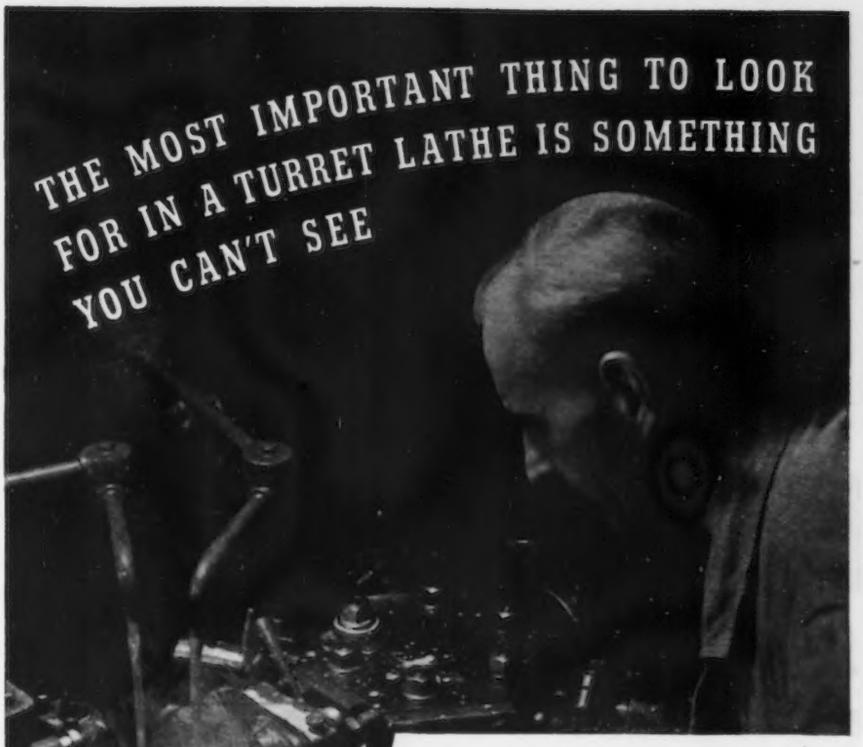
The measure sidetracked by the Rules Committee provided a minimum wage of 25c. per hr. and an hour maximum of 44 per week with graduated liberalization over a three-year period until a 40-40 ratio is reached. It had strong Administration backing. No Southern differential was provided.

But of equal importance in turning thumbs down on the bill was the continued opposition of Southern Democrats on the committee. One out of four Republican members voted for the measure, although there had been some speculation in Congress as to whether Republican members from Northern states might seek passage as a weapon to prevent further migration of factories to lower-wage areas. In the absence of any vote on the House floor, the extent of such a movement could not be calculated. The Rules Committee's vote was 8 to 6.

Green Again Hits NLRB

While the AFL executive council meeting in Washington was assailing its labor rival for previous endorsements of wage-hour proposals, William Green renewed his attacks on the Labor Board for its alleged CIO bias, charging that the board's conduct in several recent cases facilitated the "raiding" efforts of the Lewis-dominated labor group.

"We feel that the Wagner Act is being very badly administered by the



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—A corps of field engineers are constantly working with hundreds of industrial concerns, and passing on to you the ideas for savings, for more scientific tooling, for greater accuracy which these contacts discover.

—Every man in this Company is proud of the fact that he is helping to build Warner & Swasey Turret Lathes and to carry on this Warner & Swasey tradition.

All this is something we cannot show you—something we cannot really express. *But the turret lathe we build expresses it*—in extra years of trouble-free service—in speed and power and accuracy maintained long after ordinary machines would be worn out—in ease of operation your workmen appreciate—in savings you'll see from less scrap loss, less down time, greater production at lower cost.

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Labor Board," the AFL chieftain said. "As far as I know there is no sentiment in the federation for repeal of the act but there is very definite dissatisfaction with the way in which it is being administered. We believe the act itself is sound and would meet the requirements of labor if administered properly."

To what extent the federation is prepared to go in seeking a housecleaning at the NLRB in an effort to correct maladministration mistakes credited to the board is open to speculation but it was considered significant that the AFL continues to complain against Labor Board activities after months of openly expressed dissatisfaction. Ostensibly, the step is a necessary one before any program to revise the Wagner Act gains much headway in Congress.

Labor Trouble Grows

Another factor indicating the scope of widespread labor trouble is the increase of cases continually coming before the NLRB for adjudication. Cases docketed with the board during March, according to the agency's own figures, represented an increase of 44 per cent over the February cases when 623 were filed. A total of 896 was the March figure, the latest to be made public by the board. It is estimated that 75 per cent of the board's 13,381 cases, involving 3,398,727 workers, filed since its inception in 1935, have been closed, leaving around 3500 cases pending as of April 1.

At the same time, the Supreme Court in a decision handed down by Chief Justice Hughes warned against any high-handed methods employed by quasi-judicial governmental bodies. The NLRB was not mentioned, since it was a case involving the Secretary of Agriculture, but it was generally interpreted as constituting a blanket warning to such agencies as the FTC, the SEC and especially the Labor Board against which repeated charges have been made for the activities of its army of trial examiners and other officials.

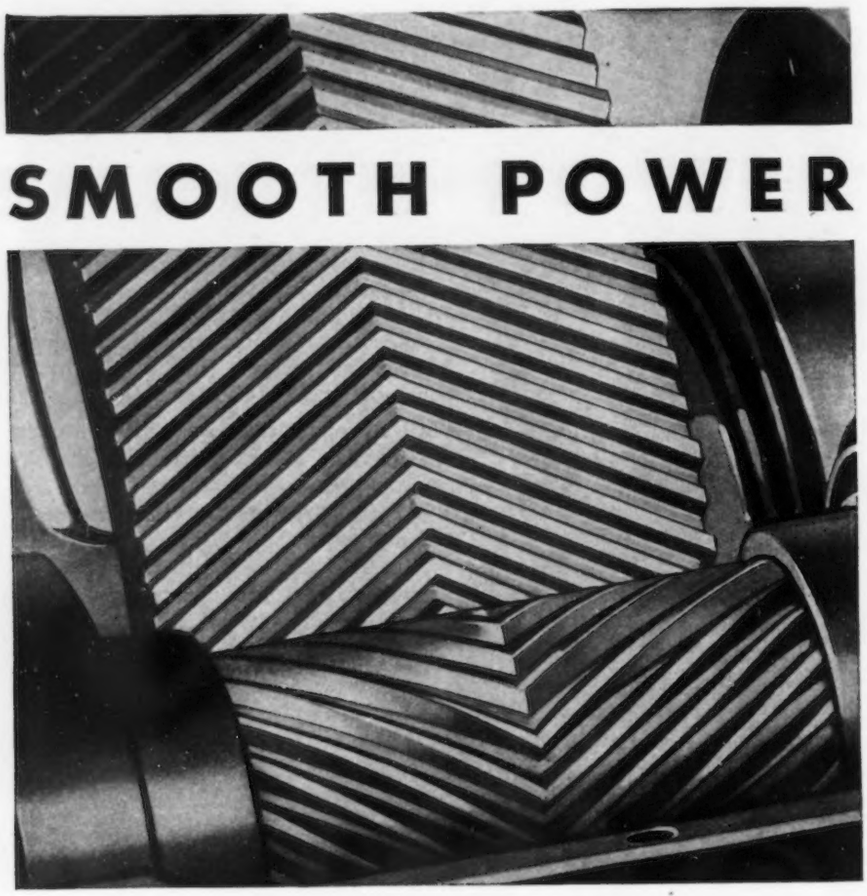
Must Be Fair

"The maintenance of proper standards on the part of administrative agencies in the performance of their quasi-judicial functions is of the highest importance and in no way cripples or embarrasses the exercise of their appropriate authority," the court said. "On the contrary, it is in their manifest interest. For . . . if these multiplying agencies deemed to be necessary in our complex society are to serve the purposes for which they are created and endowed with vast powers, they must accredit themselves by acting in accordance with the cherished judicial tradition embodying the basic concepts of fair play."

After the court's decision the Labor Board's general counsel revealed that the board is "seriously considering" the rescinding of orders against Republic Steel Corp., largely involving rehiring of striking employees, and reopening of inquiry into Ford Motor Co.'s labor practices. Said a Ford attorney:

"In plain English, this means that by withdrawing its suit (the board) hopes to avoid an investigation of the manner in which it arrived at its decision in the Ford case and the submission of its procedure in that case to the scrutiny of an impartial court."

Among the numerous complaints made against Labor Board procedure is the charge that examiners' reports



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are not submitted to opposing counsel so that exceptions can be taken before final legal orders are entered. The decision added credence to reports that the courts would sooner or later take steps to correct the board's procedure. On Monday the Board filed a motion in the Circuit Court at Covington, Ky., to withdraw its Ford decision. Members would not say whether the Inland Steel case would be reopened.

The AFL also during the week threw its support behind an organization drive sponsored by the Progressive Miners of America, traditional rivals of the CIO's United Mine Workers Union in the Illinois bituminous fields. The union forecast membership gains in 10 states. This action, together with AFL threats to purge its ranks of affiliates sympathetic to the CIO, was regarded as the federation's answer to Generalissimo Lewis' plan to establish the CIO on a permanent basis.

The railroad brotherhoods also announced last Friday that they will resist the 15 per cent wage cut voted for July by railroad management representatives at Chicago. Leaving a White House conference with President Roosevelt, George Harrison, president of the Railway Labor Executives Association, expressed disappointment that the railroads would launch a movement to cut wages and dry up purchasing power in view of the President's efforts to increase purchasing power. "The railroad problem is not as acute as management representatives are endeavoring to make the public believe," he said.

More Warehouse Chapters Elect

THE following chapters of the American Steel Warehouse Association have elected officers as follows for the coming year, according to W. S. Doxsey, executive secretary.

Detroit chapter: president, A. N. Koch, Steel Plate & Shape Corp.; secretary-treasurer, Steven R. Olson, Steel Sales Corp.; national director, F. A. Wittman, Jones & Laughlin Steel Corp.

Central States chapter: president, W. D. Monroe, Chicago Steel Service Co.; vice-presidents, E. G. Fisher, National Steel Co., and Bud Lowenstine, Central Steel & Wire Co.; secretary, C. G. Bothwell, Edgar T. Ward's Sons Co.; treasurer, L. J. Quetsch, A. M. Castle & Co.; all of Chicago. Mr. Monroe will also serve as national director.

St. Louis chapter: president, W. Milner Donovan, Donovan Iron & Supply Co.; vice-president, Bruce Haines, E. E. Souther Iron Co.; secretary, E. W. Fleer, Schurk Iron Works, Inc. Mr. Donovan will also serve as national director.

Northwest chapter: president, L. B. Douglass, Scully Steel Products Co.; vice-president, Joseph Paper, Paper, Calmenson & Co.; secretary, G. A. Thieme, Scully Steel Products Co.; all of St. Paul. Mr. Douglass will also serve as national director.

Cincinnati chapter: president, Arthur Hupp, Central Steel & Wire Co., Dayton; vice-presidents, John W. Herr, Cincinnati Steel Products Co., and T. J. O'Laughlin, Springfield Hardware Co., Springfield; treasurer, J. C. Betz, S. A. E. Steels; secretary, Charles Dickerson, Miami-Dickerson Steel Co., Dayton; national director, John A. Thiele, Miami-Dickerson Steel Co., Dayton.

Household Equipment Sales Up in March

MARCH shipments of washing machines were 117,025, and 23.5 per cent over February, according to J. R. Bohnen, executive secretary of the American Washing Machine Manufacturers' Association, while March sales of vacuum cleaners mounted 35 per cent above February's total to 135,543. The latter figure came from the Vacuum Cleaners Manufacturers' Association.

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FCC Dies and Tools of air or oil hardened tool steel can be cast to shape within 1/8 inch of finished size, even on the most intricate shapes. The great saving in machining time is important on your rush jobs—and highly profitable on *all* jobs. These unusually hard, wear-resistant alloy steels also give you longer service and still more savings.

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. . . THE NEWS IN BRIEF . . .

Automobile production slumps to 57,555 as Chevrolet closes all plants for week.
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Gar Wood announces profit-sharing plan.
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Opponents again block Roosevelt's demand for wage-hour legislation.
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U. S. Chamber of Commerce holding annual gathering.
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Supreme Court warns of "unfair" federal agencies.
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Gear makers hold large meeting at Niagara Falls.
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Reinforcing Steel Institute holds 14th annual meeting.
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Welding application studied at Pittsburgh three-state meeting.
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Bethlehem earns $994,908 on 34.6 per cent rate of operation.
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Japan proposes to supply own machine tool needs.
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Roosevelt wants identical bids made prima facie evidence of guilt.
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Warehouse men have plan for mill relationship.
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Machine Tool Builders meet in Chicago.
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Apollo independent union agreement reopens plant.
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N.A.M. asks aid for private enterprise.
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March machinery exports show increase.
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CONVENTIONS

May 10 to 12—American Society of Mechanical Engineers, machine shop practice division, Sagamore Hotel, Rochester, N. Y. Secretary is J. R. Weaver, Westinghouse Electric & Mfg. Co., East Pittsburgh.

May 14 to 19—American Foundrymen's Association, annual convention, Cleveland. Secretary, D. M. Avey, 222 W. Adams Street, Chicago.

May 23—National Association of Purchasing Agents, Jefferson Hotel, St. Louis. Secretary of the association is G. A. Renard, 11 Park Place, New York.

May 23 to 24—Associated Machine Tool Dealers, Dearborn Inn, Dearborn, Mich. Secretary of the association is T. A. Fernley, Jr., 505 Arch Street, Philadelphia.

May 25 to 26—National Metal Trades Association, Hotel Biltmore, New York. Harry S. Flynn, Peoples Gas Building, Chicago, is secretary.

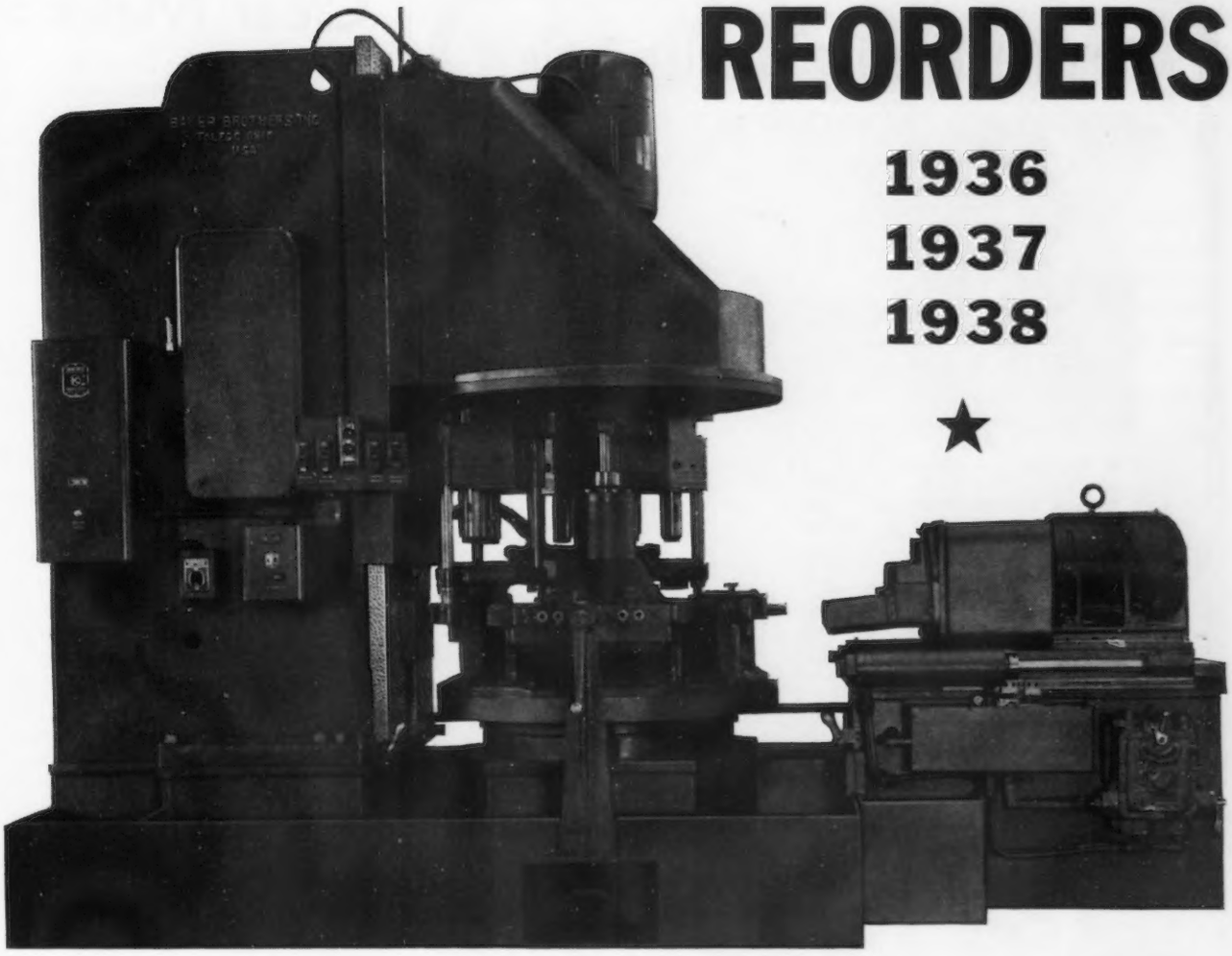
May 26—American Iron and Steel Institute, Waldorf-Astoria Hotel, New York. Walter S. Tower, 350 Fifth Avenue, New York, executive secretary.

June 12 to 17—Society of Automotive Engineers, Greenbrier Hotel, White Sulphur Springs, W. Va. John A. C. Warner, secretary and general manager, 29 West 39th Street, New York.

REORDERS

1936
1937
1938

★



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The 75 HO, as tooled here, has a 4 station indexing table. It machines two bores in tractor link forgings — core drilling and reaming two holes and rough and finish counterboring a large hole. A separate head drills cross holes.

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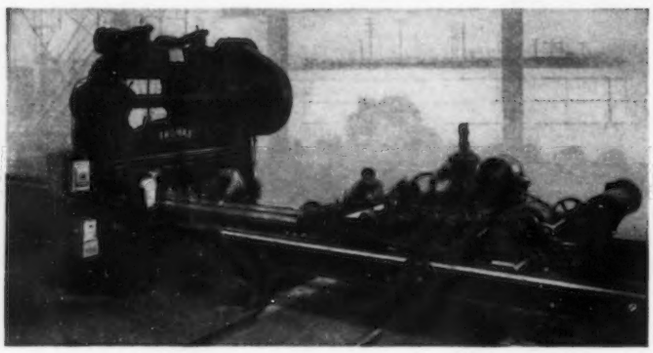

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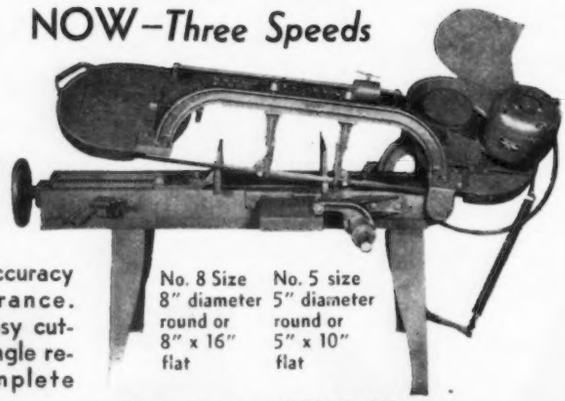

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Gear Makers Hold Large Meeting

DESPITE current business conditions, the 22nd annual meeting of the American Gear Manufacturers Association, held April 25-27, at the Hotel General Brock, Niagara Falls, Ont., easily topped all previous records for attendance.

Furthermore, with 12 papers, each formally discussed by three or more members, and dealing with current problems, such as durability of helical gears, gear sounds, gear lubrication and the like, the program of this meeting was also outstanding. Entertainment features included an informal dinner, with an elaborate floor show and dancing, and a showing of moving pictures taken during several previous A.G.M.A. conventions by A. A. Ross, engineer, General Electric Co., and a past president of the association.

Election of officers resulted in the naming of Howard Dingle, president, Cleveland Worm & Gear Co., president, to succeed H. H. Kerr, president, Boston Gear Works, Inc. Charles F. Goedke, president, Ganschow Gear Co., Chicago, was named vice-president. J. Harper Jackson, Jackson Gear Co., Pittsburgh, is treasurer and J. C. McQuiston, Wilkinsburg, Pa., is manager-secretary.

New members of the executive committee are: L. R. Botsai, Westinghouse Nuttall works; Paul Christensen, Cincinnati Gear Co.; J. Harper Jackson; and W. P. Schmitter, Falk Corp., Milwaukee.

One new company, namely, the Parkersburg Rig & Reel Co., Parkersburg, W. Va., was admitted to membership.

Cost Committee Stages Play

Reports at the opening session of the meeting included that of the commercial standards committee, which is headed by F. H. Fowler, president, Foot Bros. Gear & Machine Co., Chicago. Data on depreciation were presented at a later session by H. N. Mathias, chairman of the association's

uniform cost accounting committee. A one-act play written by Mr. Mathias and entertainingly acted by several prominent members of the association served admirably to heighten the committee's emphasis on the importance of depreciation.

In a thoughtful address on "Long Time Program for the Business Enterprise" Mr. Fowler gave comprehensive data relating to analysis of product, of plant and equipment, of personnel, and of working capital. His discussion had reference to a manufacturing enterprise of moderate size, and one already in existence.

Technical Standardization Active

Technical standardization continues a major A.G.M.A. activity. T. R. Rideout, engineer, Westinghouse Nuttall Works, and chairman of the general standardization committee, reported that four of the association's recommended practices have been referred to sectional committees of the American Standards Association for approval before becoming American standards. They are: Backlash for Spur Gears; Keyways for Gear Bores; Non-Metallic Gearing, and Roller Chain Speeds.

A recommended practice for lubrication is being considered, and a joint conference with section committee Z-II on Petroleum Products has been proposed. Revision of the association's recommended practice for holes in gears and for electric railway gearing is contemplated.

One of the most active committees is that on speed reducers headed by R. B. Moir, chief engineer, W. A. Jones Foundry & Machine Co., Chicago. Its recommended practice for rating heavy-duty type worm gear reducers, adopted October, 1933, and its practice for rating helical and herringbone gear speed reducers, adopted in 1934, have been followed by a similar recommended practice on "Rating of Planetary Type and Spur Gear Speed Reducers," presented by Mr. Moir and accepted by the association at the meeting last week.

Durability Tests on Helical Gears

TECHNICAL papers and discussion, both formal and from the floor, were of high caliber. One of the outstanding was on "Recent Durability Tests on Helical Gears," by G. P. Maurer, metallurgical engineer, Falk Corp., Milwaukee. It covered tests made at the Falk laboratory, and the correlation of results with other available data on endurance and durability of steels over a wide range of hardness. The tests were made as part of

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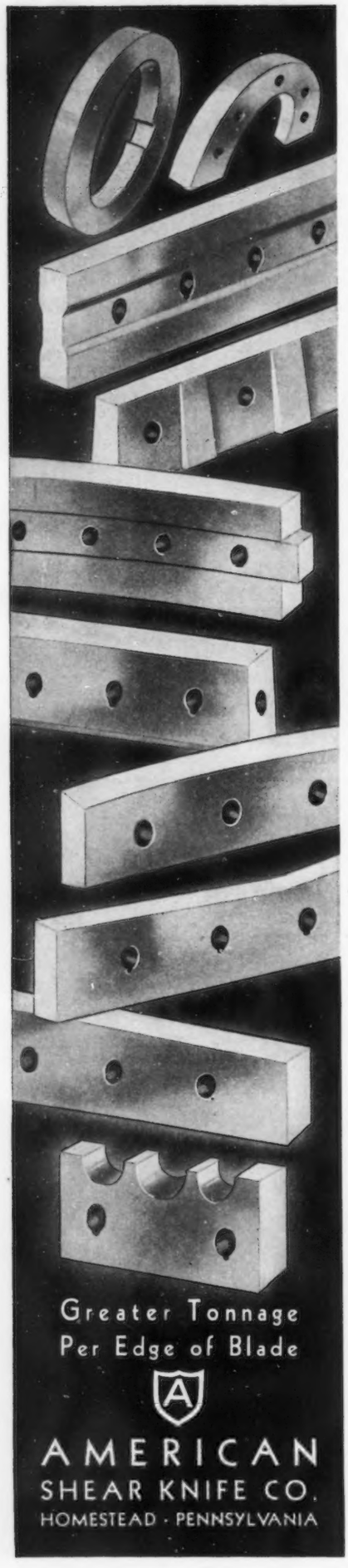


the association's helical gear research program.

Pitting of gear teeth is the most common of the several types of surface failures establishing the critical point of loading or load carrying capacity of gears, said Mr. Maurer. Test data on the endurance limit of steel and the application of the theory of contact stresses between two elastic cylinders have made it possible to evaluate gear capacity in terms of durability. This method of rating gears, in simplified form has been a recommended practice of the A.G.M.A. for helical and herringbone gearing for the past three and a half years.

A number of tests have been conducted by various member companies to corroborate actual durability with that given by the materials factor curve of the rating formula. Up to a Brinell hardness of 350 it has been found that test results check very closely with the C_m curve for both pinions and gears. In addition, gears and speed reducers rated by the recommended practice have given excellent account of themselves in service. It is, therefore, safe to state that the above limits of Brinell hardness, gear tooth durability has been definitely established. However, with the increased demand for higher hardness on gears heat treated before machining, and the equally increased use of gears hardened after cutting, the extension of the materials factor (C_m) curve for the higher hardness ranges of hardness has become necessary. The major portion of the work was carried on small-size gears, but supplementary testing was done on a number of medium-size speed reducers, as well as heavy-duty oil field pumping units.

Influence of Couplings on Gear Operation

At the same session, W. P. Schmitter and E. L. Davis, Falk Corp., presented the first part of a series of three papers on "Couplings and Their Influence On Gear Operation."

This paper, entitled "Coupling Resilience and Shock Loading" comprised discussion and mathematical development of the fundamental relations between externally applied shock and the resulting gear loads with and without resilient couplings.

A second paper will cover the functional characteristics of couplings as determined from the method used in correcting for shaft error, and a third will be devoted to the influence of coupling resilience upon the self-generated loading originating from the imperfections of the gears themselves.

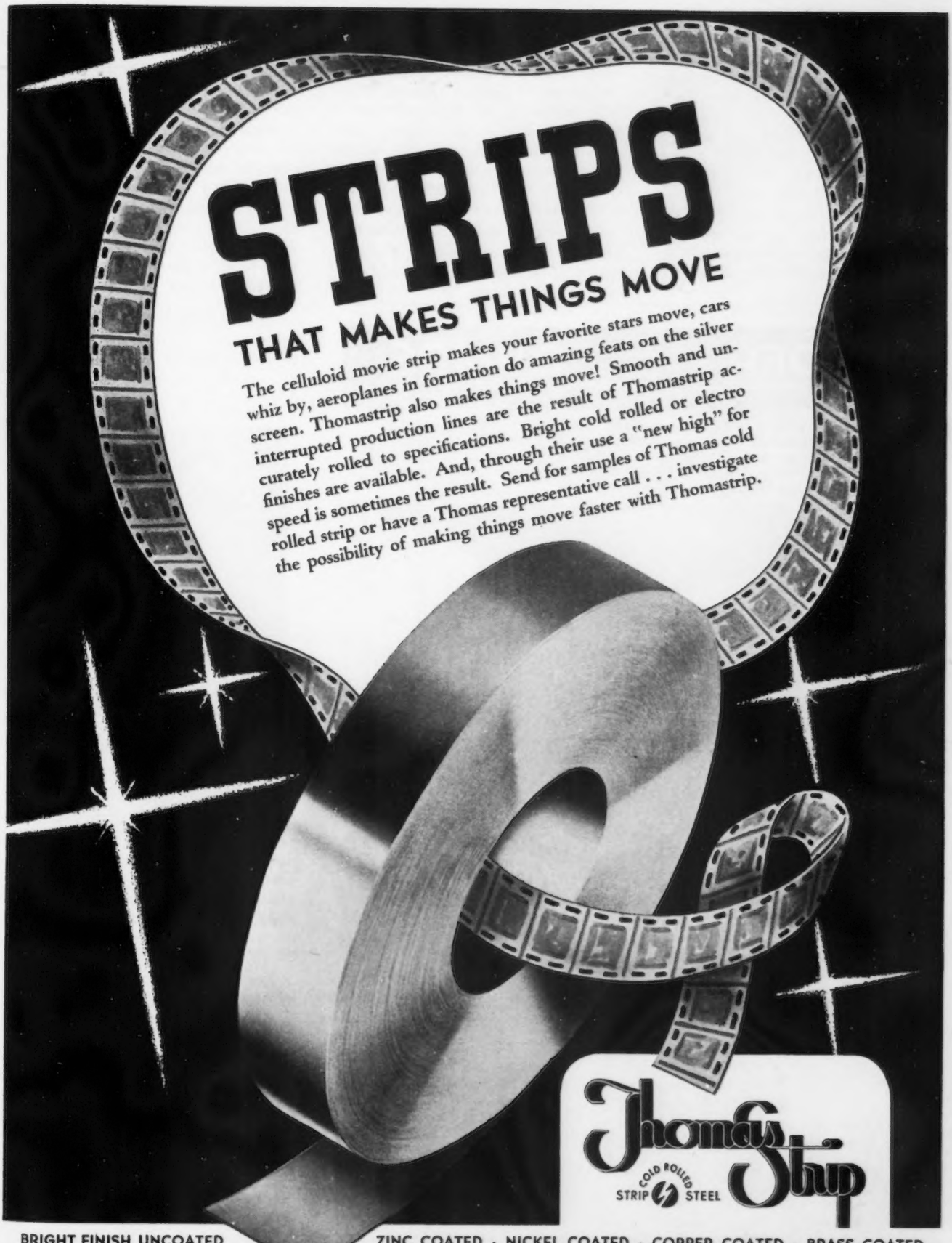
The first paper includes discussion of the desirability of coupling resilience; and in this connection it was stated that the realization that gear performance could be materially improved by utilizing resilient shaft connections resulted in the adoption by the Falk Corp. of the now well-known design invented by James Bibby. Other sections of the paper included discussion of: Stress produced by loads applied gradually, suddenly and with impact; stress and life of an actual drive shaft, with and without resilient coupling, for a 35-in. reversing blooming mill; influence on gear loading; and the location of resilient couplings.

The measurement and interpretation of gear sounds, and some of the causes of objectionable gear noise were outlined in an address on "Sound Testing," by R. S. Drum-

HOWARD DINGLE, president of the American Gear Manufacturers Association.

Following his graduation from Cornell University in 1905, Mr. Dingle, who had specialized in electrical engineering, joined the Crocker-Wheeler Electric Mfg. Co., at Ampere, N. J. After spending some time in the machine shops and other departments, he went to Cleveland as salesman, afterward becoming district manager of the Crocker-Wheeler company. Seven years later, with W. W. Clark, he organized the Dingle-Clark Co., contracting electrical engineers, Cleveland, of which he is now vice-president. He joined the Cleveland Worm & Gear Co., in 1924, as general manager, and in 1927 became its president. He is also president of the Farval Corp.

For many years Mr. Dingle has been active in the A.G.M.A. He served as chairman of two important committees—commercial and worm gear—and was active in formulating the present A.G.M.A. speed reducer ratings. During the N.R.A. he was vice-chairman of the Code Authority of the gear manufacturing industry.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mond, president, National Broach & Machine Co., Detroit.

In considering sound testing devices, it was said to be desirable to test gears running free, also with varying brake load and with multiple speeds throughout the useful range; also to test them in both directions, that is, for drive and coast.

In discussing causes of noise, Mr. Drummond pointed out that anti-friction bearings are sometimes set up too tightly in their races, or at least too tightly to operate with the given accuracy of the parts. One of the most important causes of sounds is the contact of teeth on approach. Contact of the tip of the teeth against protuberances on the mating gear near the base circle was said to give one of the worst gear sounds, avoided in some instances by cutting off the addendum of the mating part.

Barreling or crowning of the face of gears is a new element of design which avoids much noise, said Mr. Drummond. It has proved of great value in heat-treated parts. A large proportion of parts can be used without finishing after heat treat as the crowned or barreled surfaces avoid certain slight errors of form. This barreling or crowning is used to the extent of 0.001 in. between mating parts with a face width of 2 in.

In discussing materials and cutting methods used to eliminate sounds, it was said that many gear drives are now being manufactured from gears shaved after heat treatment.

Gear Lubricants

Important characteristics of gear lubricants and their effect on gear lubrication were covered in a paper by C. W. Bohmer, Jr., engineering division-sales department, Standard Oil Co. of New Jersey.

Foaming of gear lubricants, it was pointed out, is usually due to contamination or mechanical faults, but may be caused by using lubricants too high in viscosity, particularly in the case of high-speed gears. In preventing foaming, tests were said to indicate the desirability of using as low a viscosity as other conditions permit.

Viscosity - temperature characteristics of a lubricant were discussed. The advantage of high Viscosity Index lubricants was said to be in preventing thickening and attendant drag

CHARLES F. GOEDKE, president, Ganschow Gear Co., Chicago, and vice-president of the A.G.M.A. Mr. Goedke has been active in the association since its founding in 1917, when he was an official of the William Ganschow Co., Chicago.

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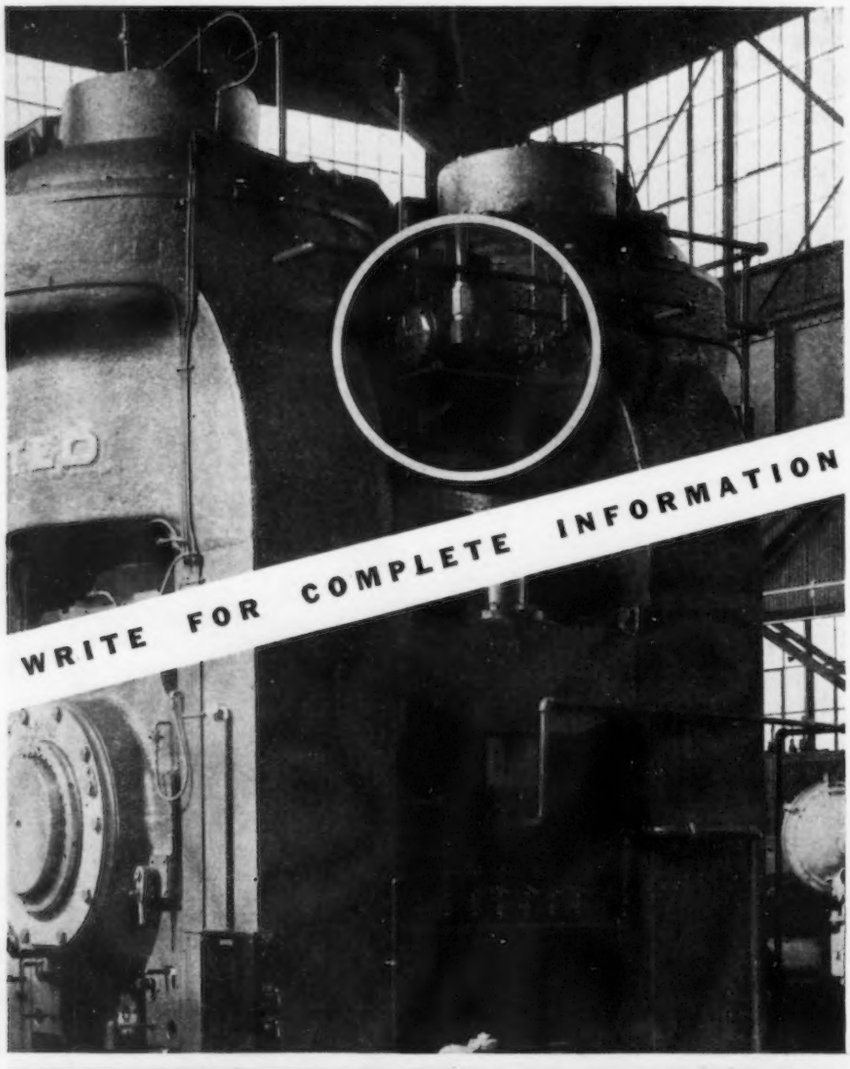
Are available in a wide range of sizes for every purpose requiring up to 700 gallons per minute and for pressures of 750 pounds. The ROPER shown here in connection with the lubrication of 'screw downs' is further evidence of ROPER'S increasing popularity in the steel production field.



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upon the gears at low temperature and excess thinning out at high temperatures with the possibilities of scoring the teeth due to insufficient oil film.

A section on load carrying ability was confined for the most part to the lead soap-active sulfur extreme pressure (EP) type of lubricant, and included data on their so-called corrosiveness to copper-containing alloys and their wear characteristics on anti-friction bearings. On the basis of both laboratory and field experience such lubricants were said to have been recommended for worm gears using bronze worm wheels. It was stated that lubricants of this type when properly manufactured, will cause no greater wear of anti-friction bearings than straight mineral oils.

Demonstrates High-Speed Photography

High-speed photography, including its use in solving industrial problems, was demonstrated by J. L. Boon and L. D. Martin, Eastman Kodak, Co., in several reels of moving pictures.

These pictures were of two types, namely, the stroboscopic type produced by Edgerton at the Massachusetts Institute of Technology, and the optical compensator type, a later development of the Eastman Kodak Co. Industrial applications, some in color, included studies of fuse burn-outs, the action of cams and followers and of high frequency springs, and studies of diesel engine ignition, the latter at 4000 pictures per second.

Other papers included one on "Phenolic Laminated Materials," in which H. R. Moyer, application engineer, Westinghouse Micarta Works, outlined the early history of Micarta and described the manufacture of the material and the general forms of finished product.

In an extensively illustrated paper on "Silent Chain—Its Application to the Drive Problems of Industry," J. M. Bryant, Link-Belt Co., Indianapolis, showed that silent chain has kept pace with industry, both in the field of stationary and mobile equipment. Drives ranging from a flea-powered 3/16-in. pitch chain up to 2½-in. pitch in extremely high horsepower rating are now available.

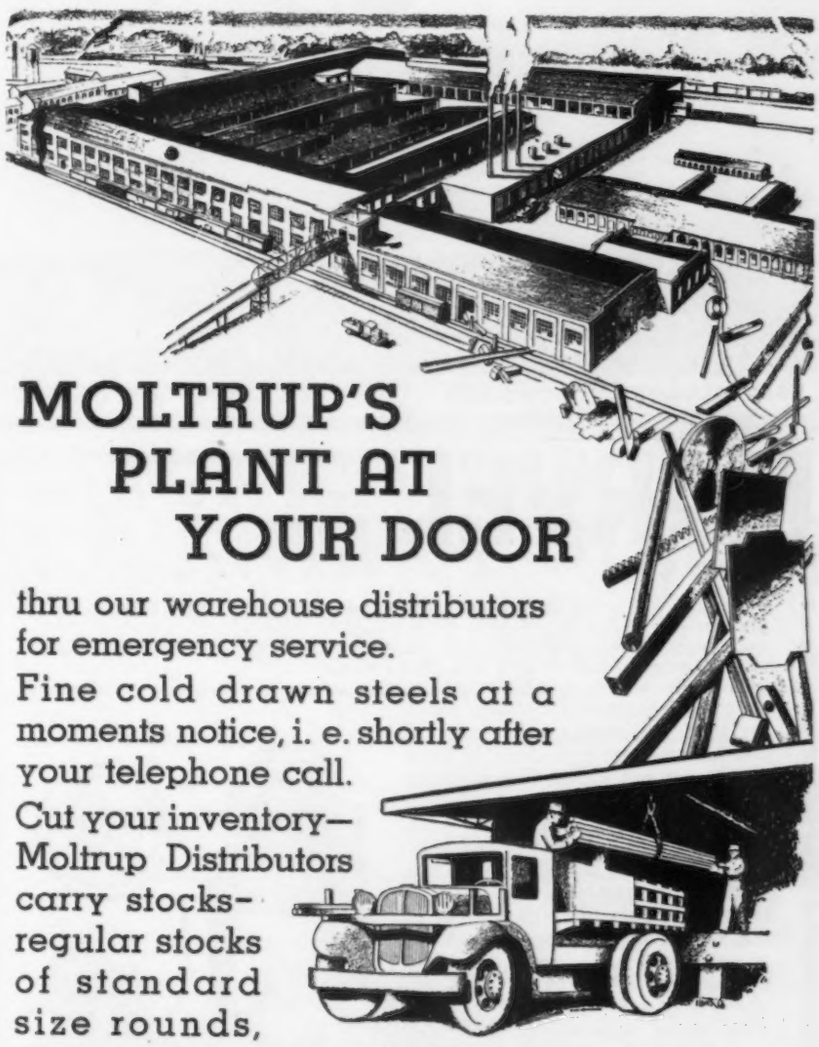
Thomas Barish, Marlin-Rockwell Corp., Jamestown, N. Y., in a paper on "A Theoretical Comparison of Ball and Roller Bearings" compared the theoretical action of the two in carrying loads and how this affects their practical use and performance.

Advantages of arc welded construction in the production of gears were discussed by H. S. Card, development director, Electric Welding Section, National Electrical Manufacturers Association. An interesting outline of the college training of mechanical engineers at the University of Michigan was given by Frank A. Mickle, associate professor of mechanical engineering, and an academic member of the A.G.M.A. Further reference to some of these papers will be made in forthcoming issues of THE IRON AGE.

Steel Payrolls Up 13% During March

STEEL payrolls rose 13 per cent in March to $51,386,000 from $45,599,000 in February, according to the American Iron and Steel Institute. The March 1937 payroll was $90,863,000.

An average of 455,000 men were employed in the industry during March, 461,000 in February and 577,000 in March 1937. Hourly earnings in March averaged 81.8c. per hr. against 81.3c. an hour in February.



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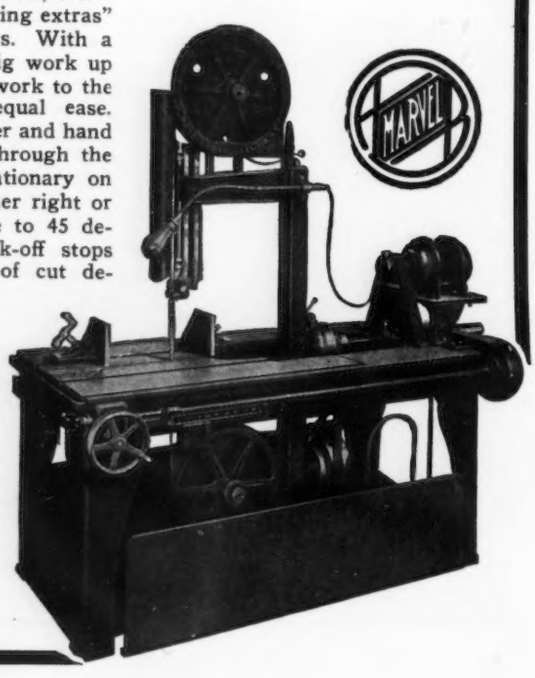

Reinforcing Steel Institute Holds 14th Annual Meeting

GENERAL HUGH S. JOHNSON, with his customary vigor and fearlessness, struck home at the causes of the current recession in an address at the 14th annual meeting of the Concrete Reinforcing Steel Institute held last week at Hot Springs, Va. Other speakers on the program were President Frank T. Sheets of the Portland Cement Association who spoke upon the subject of "What the Future Holds for Reinforced Concrete," and Mike Grady, foreman of the Pennsylvania Railroad Shops at Canton, Ohio, who discussed human relations in industry.

Kenneth D. Mann, executive vice-president of the Truscon Steel Co., Youngstown, was reelected president of the institute. James F. Curley of the Concrete Steel Co., New York, and Albert C. Weihl of the Pollak Steel Co., Cincinnati, were reelected vice-presidents and Mark Beeman executive secretary.

New directors elected to succeed those whose terms expired were George W. Connors, Jr., Connors Steel Co., Birmingham; H. P. Ladds, Sweets Steel Co., Williamsport, Pa.; John D. Roberts, Central Texas Iron Works, Waco, Tex.; Ralph T. Rowles, Jones & Laughlin Steel Corp., Pittsburgh; and S. V. Taylor, Concrete Steel Fireproofing Co., Detroit.

General Johnson's Address

The complete text of General Johnson's address will shortly be printed and will be made available for distribution upon request to the Chicago office of the Concrete Reinforcing Steel Institute. Extracts from his address follow:

"Why do we have rules against monopolies? There is the question Government must answer first of all. Is it to protect the consumer against high prices and oppressive practices and to insure to workers the best wages and working conditions? Undoubtedly that was the original intention of this basic principle.

"But that is very far from the belief and intention of many so-called anti-monopolists. Their purpose is to protect the little fellow in business regardless of whether that gives the cheapest and best service to consumers and the highest and best working conditions to labor.

"Now there is a difference here as

stark as the difference between night and day or black and white. I cannot too strongly emphasize what I am saying to you now. It is one of the most important decisions in our national life. Are we to take the enormous consumer advantages of bigness and mass operations and reasonably regulate them to prevent abuses and extortions on consumers? Or are we to break them up into little pieces, harass and oppose them at the inevitable cost to consumers of higher price and poorer service and to labor of lower wages and worse working conditions?

"I am not now condemning one side of the argument or the other. I am merely trying as vividly as I can to present a vital question of public safety of which there has been no sufficient definition or decision and about which it seems to me that, due to that murkiness, Government itself is floundering about like a drunken man in a fog creating new uncertainties which, added to many existing ones have prevented our profits system from working and is a principal cause of continued unemployment and business paralysis."

The Paralysis of Business

"It is these uncertainties and inconsistencies that paralyze business—inconsistencies on every principal front. The Administration decries high prices as a pinch on workers' buying power and in the same breath advocates every known inflationary policy to make prices high in the very manner most certainly designed to destroy workers' buying power.

"It wants a wages-and-hours bill to stabilize workers' income—but it insists on exempting the very class of workers who are most in need of such governmental intervention — farm workers.

"It insists in industry on low prices regardless of losses and on decentralization of control, yet in agriculture is using every device of centralization and higher price that imagination or ingenuity can conceive.

"It seeks to succor cotton farmers and regards Southern tenant farmers as its chief concern, yet at the same time pursues a policy designed permanently to destroy the export market for cotton, which is more than 50 per cent of its entire market.

"It takes great quantities of farm land out of cultivation by purchase and restriction of use and at the same time constructs huge irrigation projects and other means designed to increase surplus production.

"It belabors business to expand employment and new industries and insists on tax policies that make any

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2315	3130	4340	6150
2320	3135	4345	X4130(Aircraft)
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For those who wish to take advantage of constant metallurgical improvement and development long before they are incorporated in S.A.E. standards, or where close selection of material for analysis, grain size, control and quality is desired, we offer

ALLOY HY-TEN GRADES

THE HY-TEN OF TODAY IS THE STANDARD STEEL OF TOMORROW

"A"1X	"B"2	"B"4	"B"43
"A"15	"B"3X	"B"5	"M" Temper

Rounds Squares Flats **BARS and FORGINGS** Hexagons Octagons

Warehouses CAMBRIDGE CLEVELAND CHICAGO

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Send for Data Sheets

Warehouses DETROIT NEWARK BUFFALO

such expansion stark physical impossibilities.

"There is no time to catalog this dizzy maze of conflict in policies. You can find them under every principal head of administration. It is, as someone has said, like a man mounting a horse and attempting to gallop furiously in all directions at the same moment of time.

"At the bottom of all this is the greatest and most paralyzing inconsistency of all. It is the mother inconsistency—that Government is trying to operate at one and the same time the capitalist and profits system and some form of modified socialism. It can't be done. The profits system depends on the hope of gain to activate individual effort and the investment of capital. Socialism depends on the fear of punishment to activate production.

"You can try either. But you can't try both. Hope of reward through individual action requires too much individual freedom to work in the same field with fear of punishment through state control. Fear of punishment requires too much dictatorial or arbitrary power over business to persuade people to risk their capital in the hope of gain.

"You don't have to seek far for the cause of this depression and the threat of continued misery and unemployment. It is the paralysis of our traditional forces of recovery and prosperity due to these colossal uncertainties, these incredible inconsistencies, this inexcusable ignorance of the essential fiscal, economic and spiritual forces which are the engines which activate our American life. These are the forces that in the shortest time and to the most magnificent result in the whole of human history peopled this continent with the richest and most effective nation on earth. They, and they alone, are the forces, which if released from this cockeyed bondage, can restore it—and more than restore it. They can bring it a greater prosperity than it has ever known.

"There is every evidence that daily the people are becoming more aware of this and that Congress is reflecting their awakening. When enough people awaken, we need have no fear. Congress, after all, is merely a mirror reflecting the popular will and so, with a little greater lag, is the Chief Executive. Congress has begun to function again. It seems determined to restrict Mr. Roosevelt to his office. With his retirement to the Presidency and an inevitable exodus of our amateur economic repair-men, our capitalist system will be permitted to work again and the depression will be over. From all present indications, it won't be long now."

Address by Frank T. Sheets

President Sheets of the Portland Cement Association in discussing the future of reinforced concrete stressed particularly the widening of the structural, housing and highway markets as the chief factors. In the structural field he dealt with a more national adoption of architectural concrete design, rigid frame bridges, shell dome construction and the like. The housing field, he stated, offers a tremendous potential market for the concrete house. Answering critics who seemed to think that a highway holiday should be observed he stated that on primary highways alone throughout the United States it has been estimated that more than three and one-half billion dollars should be spent in badly needed modernization.

Super-
Service
Radial
Drill
Saves 50%
Schramm, Inc., at West Chester, Pennsylvania, report that this 5' arm, 15" diameter column SUPER SERVICE Radial Drill has increased production more than 50%.
Performing an important operation on Schramm Compressors . . . . .
SCHRAMM
Boring cylinders in the block of the Schramm "Utility" air compressor is one of the most important operations in the production of these nationally known, stationary compressor units. Accuracy and smooth cutting, of paramount importance in this phase of production—are achieved through the use of a Super Service Radial. Diameter of bore is 5½" in the larger compressors, although smaller bores and a diversity of work are also handled on this machine.
Ability to perform precision boring operations successfully and economically is but another reason why progressive manufacturers rely on Super Service Radials.
THE CINCINNATI BICKFORD TOOL CO.
OAKLEY CINCINNATI, OHIO, U. S. A.

Welding Applications Studied At Pittsburgh Three-State Meeting

PITTSBURGH—Welding applications including recent and future developments in building construction, machinery manufacture and steel production were topics discussed here last week when more than 200 members of the American Welding Society and Pennsylvania engineers attended a tri-state conference.

In manufacture of power excavators by his company, H. C. Hettelsater, Harnischfeger Corp., Milwaukee, considered one outstanding development to be the welding of both upper and lower frames, making each a self-contained welded unit. It has been found advisable in most cases to change the shape and general construction of pieces in order to obtain the fullest benefit in the use of welding, he said. One example cited was the bending of a plate into a U-shape, thus requiring less welds. The lighter weight of welded structures while retaining required strength and the increasing use of alloy steels, were also touched upon. Mr. Hettelsater felt that the increased use of welding in machine manufacture is laying the foundation for revival in those industries which supply welding and accessory equipment.

According to R. E. Kinkead, consulting engineer, Cleveland, use of welding in steel mill maintenance and repair work will ultimately affect design of new machinery. He also stressed the success now being obtained in the field of strip welding prior to cold rolling and forecast outstanding gains in this development. Mr. Kinkead said the field for welding in the manufacture of composite metals is practically unlimited.

Using moving pictures, A. S. Low, vice-president, Austin Co., Cleveland, described welded construction in recent industrial buildings. Recent contributions by his company, he said, included two modern all-welded rigid frame designs which convert ceiling areas to maximum usefulness. Another unusual industrial design described by Mr. Low employs portal trusses which provide three integral conveyor levels. These welded trusses form part of a rigid frame and are designed for installation of conveyors which can be either suspended from the top chord or operated on rails resting on the bottom chord or installed directly on the bottom chord, the lower flange of which will function as a rail. The truss permits simultaneous use of any two or all three of these levels.

A. E. Gibson, president, Wellman Engineering Co., Cleveland, said cost of welding can be reduced by change of design and bending steel to form various shapes by keeping to a minimum the number of welds necessary. Also stressed was the importance of fixtures to position work preparatory to welding in order to cut down work time and thus reduce total costs.

Other speakers included C. E. MacGuffie, General Electric Co., who presented motion pictures showing welding arcs and flash welding of rails; and P. J. Lang, chief engineer, Baltimore & Ohio Railroad, and president, American Welding Society.

Success of this first spring Tri-State Welding Conference will result in it being a yearly affair to supplement the society's annual conventions.

A New Booklet on Power Factor Correction

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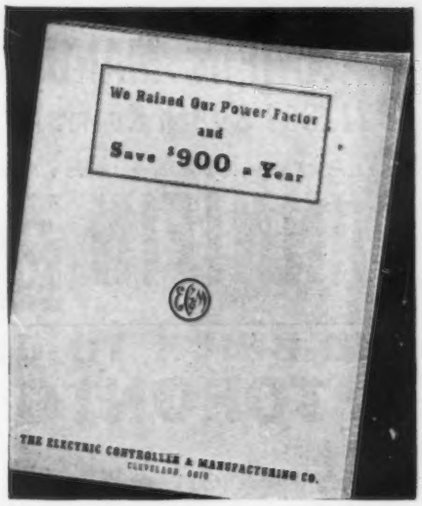
to Industrial Plants, Power Companies, Representatives of Motor Manufacturers etc.



THIS BOOKLET describes: ***What causes poor Power Factor —why it is expensive—what steps may be used to determine if poor power factor is present—what methods may be used for correction.***

Now available . . . this new 24-page booklet, just off the press . . . complete discussion of the subject of power factor, written in a non-technical manner to permit quick understanding. Extremely useful and helpful to every industrial plant or institution using a large number of motors. Also available to power companies, synchronous motor manufacturers or their representatives and others interested in power factor correction. Merely fill out and mail the coupon below for your copy. Only a limited supply has been printed —be sure to mail coupon today.

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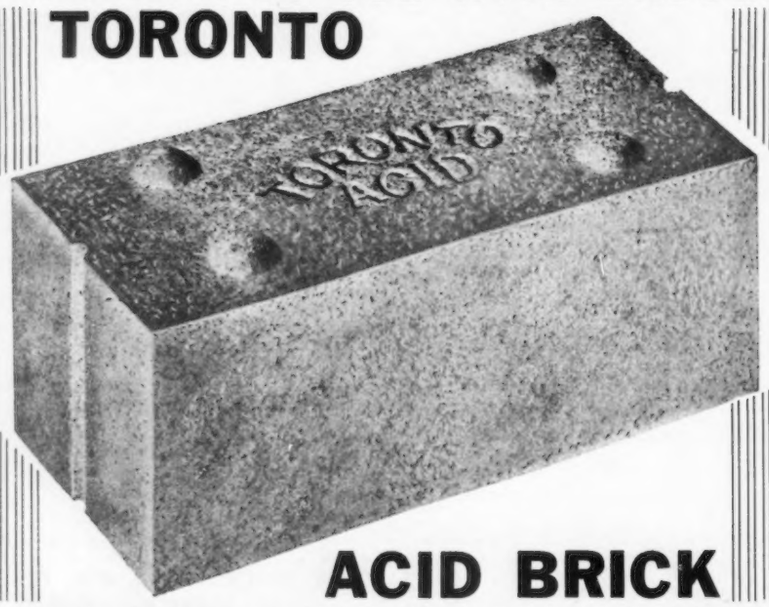

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Toronto Acid Brick and Basolit, the acid-proof cement joint, go together like bread and butter . . . because Toronto repressed, deaerated Acid Brick are designed especially for use with Basolit to make tank walls and floors impervious to any acid action. Accurately molded in stock and special shapes . . . laid up at lower labor cost. Write for free sample and full facts.

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Bethlehem Earns $994,908 on 34.6% Rate of Operation

NET income for Bethlehem Steel Corp. for the quarter ended March 31, 1938, was $994,908, or 53 per cent of preferred stock dividend requirements, compared with $8,293,833 in the like 1937 period, Eugene G. Grace, president, reported. Fourth quarter earnings last year were $4,253,329.

Announcing that first quarter operations averaged 34.6 per cent, against 45.7 per cent in the fourth period last year and 87.1 per cent in the first quarter of 1937, and that "both the steel-making and shipbuilding ends of the business are in the black," Mr. Grace said.

Unfilled orders on March 31 totaled $99,934,192 against $93,470,063 on Dec. 31, 1937, and $151,061,818 on March 31, 1937.

Expenditures for plant construction in the first quarter were $2,400,000, leaving $3,500,000 authorized expenditures to be completed.

Export buying of steel is "appreciably falling off," steel demand generally is holding at around 30 per cent of capacity, and industry is going into the summer with no signs of a pickup in business. Current steel production is 35 per cent.

Steel prices are meeting little pressure for reductions and there is little justification for lower quotations, Mr. Grace said.

Negotiations for acquisition of United Shipyards, Inc. (owning four shipbuilding plants in the New York area), for $9,320,000 cash are virtually completed and will be submitted shortly to United stockholders.

Japan Proposes to Supply Own Machine Tool Needs

THE Japanese Cabinet's planning board has proposed that a new company be formed for manufacture of machine tools for the War, Navy and Railway Ministries, the ultimate aim being to curtail imports completely, according to the United States Bureau of

Foreign and Domestic Commerce. Making the country independent of outside suppliers, the board believes that such a move would result in general standardization of machine tools in the shops of these ministries. Existing Japanese machine tool manufacturers have protested such a project, since such a company would monopolize governmental business.

Inland Pays 50c. Common Dividend

INLAND STEEL CO. and subsidiaries reported for the quarter ended March 31, 1938, a net profit of $923,076 compared with $5,008,774 in the first quarter of 1937. For the year ended March 31, the net profit after surtax was $8,886,075 against $15,929,538 the year before.

The company declared a dividend of 50c. a share on common stock payable June 1 to stockholders of record May 13. Paul D. Block, Inland's president, said that current business is about the same as in the first quarter.

Fabricated Structural Bookings Up in March

BOOKINGS of fabricated structural steel in March showed an increase over either January or February, according to the monthly report of the American Institute of Steel Construction, 200 Madison Avenue, New York. The estimated total for March was 83,977 tons compared with revised figures of 79,874 tons for January and 54,996 tons for February. March orders were 35.9 per cent of normal (normal being the yearly average 1928-1931, inclusive). March orders were less than half the tonnage booked in the same month last year, and the first quarter total this year, 218,847 tons, is also less than half of last year's first quarter total, 461,837 tons.

Shipments in March, at 100,956 tons, exceeded new orders. Shipments for the quarter, totaling 268,287 tons, were likewise well in excess of bookings for the period. Thus the industry is reducing its backlog, the total available for future fabrication as of March 31 having been 295,008 tons. In the first quarter of this year the industry shipped aproximately 50,000 tons more than it booked, while in the first quarter of last year it booked nearly 117,000 tons more than it shipped.

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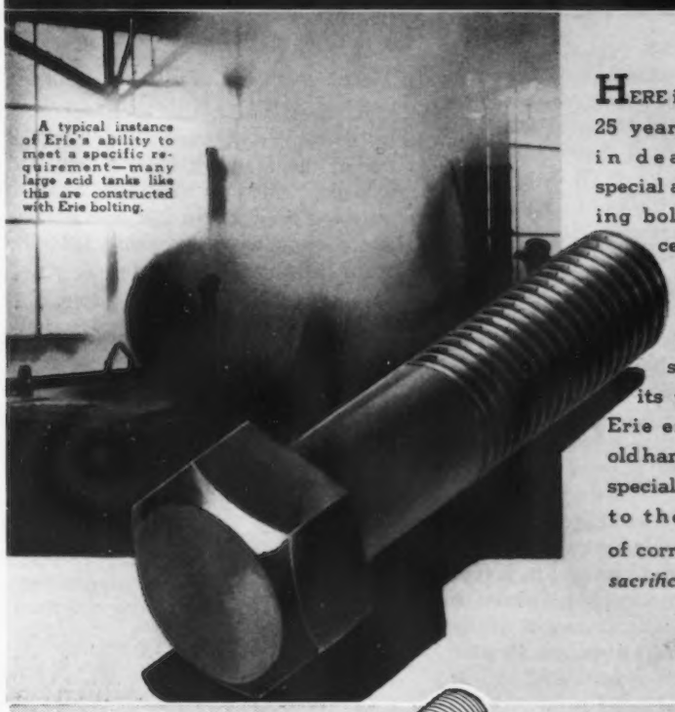

A typical instance of Erie's ability to meet a specific requirement—many large acid tanks like this are constructed with Erie bolting.

HERE is where Erie's 25 years experience in dealing with special alloys, designing bolting to successfully resist the weakening action of corrosion in service, proves its value to you. Erie engineers are old hands at applying special alloy bolting to the resistance of corrosion *without sacrifice of strength.*

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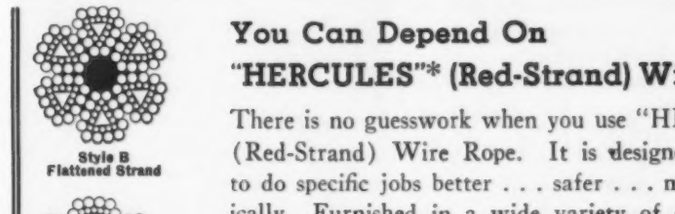

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There is no guesswork when you use "HERCULES" (Red-Strand) Wire Rope. It is designed and built to do specific jobs better . . . safer . . . more economically. Furnished in a wide variety of constructions so as to be suitable for all purposes—each backed by 81 years of manufacturing experience and close cooperation with users.

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For maximum efficiency in Preformed Wire Rope, use Preformed "HERCULES". It is available in both Round Strand and Flattened Strand constructions.

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..PERSONALS..

T. LANE WATSON has been appointed assistant manager of sales, Chicago district, Carnegie-Illinois Steel Corp. He has a continuous record of service with U. S. Steel Corp. subsidiaries, having been employed by the former Carnegie Steel Co. at Pittsburgh in 1910. He has served in executive positions in the Pittsburgh and Cleveland sales offices and since November, 1936, has served in Chicago in charge of the bar, strip and semi-finished materials division.

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R. F. FRENGER has been appointed sales manager of Westinghouse Electric & Mfg. Co.'s switchgear division, East Pittsburgh. He goes to the new positon from the staff of RALPH KELLY, vice-president, previous to which time he was manager of the company's small motors division, Lima, Ohio. He succeeds W. R. SOWISH, who has been transferred to Chicago as head switchgear specialist.

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LOUIS BAUM, who for the past 20 years was district sales manager in New York for the Truscon Steel Co., has organized his own company, the Seaboard Steel Products Corp., with offices at 205 East 42nd Street New York, and will engage in the distribution of steel building products, including reinforcing bars, bar joists, wire mesh, steel decking, steel windows and doors, metal lath and other building accessories. Mr. Baum is president of the new company.

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R. C. VAUGHN has been appointed sales engineer in the New York office of the Harnischfeger Corp., Milwaukee. He has had more than 20 years' experience in the sale of electric hoists and overhead traveling cranes in the New York area.

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JOSEPH C. ANDREWS, secretary of the credit committee of subsidiary manufacturing companies of the U. S. Steel Corp., has retired after 46 years of service in the corporation. Mr. Andrews began with the former Carnegie Steel Co. in the engineering department and upon formation of a credit committee in 1895, he became an assistant in the new department. He has worked in his recent capacity since 1902.

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H. W. GRAHAM, general metallurgist, Jones & Laughlin Steel Corp., Pittsburgh, spoke on "The Influence of the Metal Being Cut"; J. P. GILL, chief metallurgist, Vanadium-Alloys Steel Co., Pittsburgh, spoke on "The Influence of the Tool Steel"; and M. F. JUDKINS, chief engineer, Firthite Division, Firth Sterling Steel Co., McKeesport, Pa., spoke on "The Influence of the Form of the Tool" at the Pittsburgh chapter of American Society for Metals, symposium on machinability of metals, held at Pittsburgh last week.

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DR. HOWARD E. FRITZ, for a number of years head of the chemical sales division of B. F. Goodrich Co., Akron, Ohio, has been placed in charge of the newly-formed synthetic sales department. During the past year Dr. Fritz has devoted his entire efforts to the development and sale of the synthetic elastic, Koroseal.

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OLIVER C. HENKEL has been elected treasurer of Empire Sheet & Tin Plate Co., Mansfield, Ohio, to succeed his father, C. H. HENKEL, former vice-president and treasurer, who asked to be relieved of his duties.

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C. B. STIFFLER, appointed last week by William C. Knudsen, president of General Motors, to the position of general manager of United Motors Service, Inc., a General Motors division, has been with General Motors since 1919. Born in Rushville, Ind., in 1890, he became agency accountant for the Indianapolis & Cincinnati Traction Co., later joining the Union Traction Co. of Indiana, which he served before and after the War. He was in the central office of General Motors from 1919 to 1926 when he went to the Oakland Motor Co. at Pontiac. In 1932 he transferred to the Buick Motor Co. in Flint and in

T. L. WATSON

R. F. FRENGER

LOUIS BAUM

1936 became vice-president and assistant general manager of United Motors.

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WALTER G. HELBER, for 14 years general superintendent of the Racine, Wis., factory of the Nash Motors Co., Kenosha, Wis., division of the Nash-Kelvinator Corp., Detroit, has resigned. He started as a toolmaker in the Buick plant at Flint, Mich., in 1906, and at the time of his resignation to join the Nash organization in 1924, was superintendent. During the World War he was in charge of production of Liberty engines.

WILLIAM RIEGG has been appointed successor to Mr. Helber. He was

F. R. KOHNSTAMM, manager of the Cleveland division of Westinghouse Electric & Mfg. Co., who, as announced in THE IRON AGE, April 28, will supervise all activities in connection with the Precipitron air cleaning device, manufacture and sales of which have been centralized at Cleveland.

born in St. Gall, Switzerland, where he received his technical training. Coming to America in 1905, he was appointed foreman in the motor assembly department of the former Thomas B. Jeffery Co., Kenosha, which in 1916 was acquired by the Nash Motors Co. At various times he has served as a production executive in Nash factories at Kenosha, Racine and Milwaukee.

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GEORGE A. BAHM has been named superintendent of shops by Youngstown Sheet & Tube Co., Youngstown. Formerly he was assistant superintendent of the United Engineering & Foundry Co. shops at Youngstown.

ROWLAND E. WILLIAMS has been appointed assistant superintendent of the United Engineering & Foundry Co. shops, filling the vacancy created by Mr. Bahm's departure.

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JOHN KLEMPNER, secretary and treasurer of the Curtin-Howe Corp., metal preserving engineering, Chrysler Building, New York, is the author of one of the new popular books of fiction, "No Stork at Nine," recently published by Scribners. The story concerns the lives of a young married couple in New York, one of whom wants to live in the country and the other in the city. It is Mr. Klempner's first novel.

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AL. HARD, formerly advertising manager of the Wolverine Tube Co.,

GEORGE F. BEGOON, whose appointment as sales manager for the Precipitron, air cleaning device manufactured by Westinghouse Electric & Mfg. Co., was announced in the April 28 IRON Age. He comes to the Cleveland division from the company's new products division in East Pittsburgh, Pa.

Detroit, recently severed his connections with that company.

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M. G. BEREMAND has left Progressive Welder Co., where he was formerly in charge of advertising and sales.

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C. C. ABBOTT has been appointed district sales representative in Dayton for the Newport Rolling Mill Co., Newport, Ky.

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MILTON P. HIGGINS, who has been identified for the past 10 years with the Norton Co., Worcester, Mass., has been made resident manager of the Chippawa, Ont., electric furnace plant of the company, succeeding the late John B. Glaze. Lately he has been manager of sales research.

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GEORGE M. MENCKE, formerly identified with Thomas Prosser & Sons, and later with the Carboloy Co., has been made sales manager of the Vascoloy-Ramet Corp., North Chicago, Ill. JAMES A. FRASER, formerly with the Vanadium Alloys Steel Co., North Chicago, has been appointed assistant sales manager. A. M. KEBE, C. M. GRANNIS, C. W. BLADE, formerly also with the Vanadium company, have been made district sales managers respectively of the Cleveland, Detroit, and New England territories. WALTER J. DENNIS, M. W. DENNIS, JR., have become die sales engineers in the Western and Eastern territory respectively, and S. A. MINIEA has been

WILLIAM P. ANDREWS, new manager of sales of the Carnegie-Illinois Steel Corp. in the Cincinnati district, whose appointment was announced in these columns last week.

made sales engineer in the Chicago territory.

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D. A. BARRETT, vice-president, Carnegie-Illinois Steel Corp., Pittsburgh, will assume supervision of all industrial relations activities of the company, including personnel, training, labor relations, safety and welfare. Mr. Barrett has been with U. S. Steel

D. A. BARRETT

Corp. subsidiaries for 42 years and has acted in a supervisory capacity since 1901, when he was a hot mill foreman at the former La Belle works. From 1904 to 1928 he was with the American Sheet & Tin Plate Co. as superintendent or manager in plants in the Ohio Valley, and in 1929 became assistant to vice-president and in 1933 vice-president. Mr. Barrett has been a vice-president of Carnegie-Illinois since 1936.

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K. J. BURNS has been appointed sales manager of the Youngstown district for Youngstown Sheet & Tube Co. T. C. SCHRAER has been appointed to succeed Mr. Burns as district sales manager at Cincinnati and HOWARD R. WILLIAMS has been appointed to succeed Mr. Burns as sales manager of the Indianapolis district.

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M. R. WALTON, sales manager of the oil refining division of Arthur McKee & Co., Cleveland architects and engineers, has been placed in charge of the New York office, which has been moved into the R. C. A. Building, Rockefeller Center. WILLIAM A. HAVEN, vice-president of the company, has sailed for England to supervise construction of blast furnaces at Scunthorpe.

...OBITUARY...

ARTHUR W. HUBBARD, vice-president in charge of sales of the Andrews Steel Co., Newport, Ky., died on April 26 at his residence, Ft. Mitchell, Ky. He had been in failing health for some time.

Mr. Hubbard became associated with the steel company in 1891 and from a minor position he moved up to the office of vice-president, having served as purchasing agent and sales manager before becoming vice-president in 1923.

Mr. Hubbard, who was 64 years old, was a native of Newport, and was a son of the late L. T. Hubbard, former superintendent of the Newport Rolling Mill.

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JUDD WILSON SPRAY, executive vice-president of the Bower Roller Bearing Co. for the past three years, was buried April 27, Detroit. Mr. Spray, who was 52 years old and a native of Garden City, Kan., had spent about 20 years, the major part of his business life, with Timken Roller Bearing Co., where he was vice-president and director of sales.

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ALEX R. PRIBIL, president of Saginaw Stamping & Tool Co., was buried April 27 at Saginaw, Mich. During his business life he was associated at various times with the Bethlehem Steel Co., the Cambria Steel Co., the Ford Motor Co., the Penberthy Injector Co. and the Westinghouse Electric & Mfg. Co. He settled in Saginaw in 1915. A pioneer in the development of conveyor systems and special trucks, Mr. Pribil held more than 150 patents. He was 57 years old.

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JOHN R. MCNAUGHTON, treasurer and general manager of the McNaughton-McKay Electric Co., Detroit, died April 27. This broke a partnership of the last 28 years with Arch McKay. Born in 1879 at St. Clair, Mich., Mr. McNaughton had lived in Detroit from childhood.

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JOHN C. LUTTEKE was buried April 27, in Detroit. He was division superintendent of the Spicer Mfg. Co. Born in Ferguson, Mo., 44 years ago, he had lived in Detroit for 25 years.

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JOHN C. TOBIEN, at one time superintendent of the old Cleveland Malleable Co., Cleveland; and former owner of the Ohio Foundry Co., Cleveland, died April 25 after a two-year illness. He was 89 years old.

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C. E. COOK, general sales manager, mechanical goods division, B. F. Goodrich Co., Akron, Ohio, died April 16.

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SILAS A. TUCKER, manager of the Chicago mechanical rubber goods

A. W. HUBBARD

branch of the Manhattan Rubber Mfg. division of Rayebstos-Manhattan, Inc., died on April 14 at the Presbyterian Hospital, Evanston, Ill. Mr. Tucker, who was 51 years old, had been with the company for more than 25 years.

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WILLIAM K. GLEN, Cleveland manager for the Crane Co., died in Cleveland April 28, after a short illness. He was 60 years old.

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A. LEROY ELLIS, former assistant director of the Thomson research laboratory, at the General Electric Co., Lynn, Mass., plant died on April 29 at his home in Swampscott, Mass. He was connected with the General Electric Co. for 38 years prior to his retirement in 1936, and was closely associated with Prof. Elihu Thomson. Mr. Ellis was born in Lynn 64 years ago. He was a recipient of the Pan-American silver medal for improvement of electrical appliances, and shared the Coffin award with Edward M. Hewlett for a marine appliance invention.

Roosevelt Wants Identical Bids Made Prima Facie Evidence of Guilt

WASHINGTON.—Singling out steel and cement by name, and again striking at identical bids, President Roosevelt in his 5000-word "monopoly" message to Congress last Friday recommended sweeping revision of the anti-trust laws. He suggested that "proof by the Government of identical bids, uniform price increases, price leadership, higher domestic than export prices, or other specified price rigidities might be accepted as prima facie evidence of unlawful actions."

Thus long-established and natural economic practices of merchandising would be made unlawful under the President's proposal, which is a further projection, this time by even more direct approach, of the Administration's ceaseless fight against trade practices which it has repeatedly attacked by different methods. The onslaught against identical bids obviously is directed at the basing point system prevailing in the steel, cement, and many other industries.

The bogey of identical bids has been distorted to indicate collusion, despite concession of no less a person than Attorney General Homer S. Cummings, that such bids are not proof of collusion. But the Administration wants the anti-trust laws overhauled and "identical bids" and other so-called "specified price rigidities" made prima facie evidence of guilt.

That part of the message dealing with pricing policies and related practices was derived from a Federal Trade Commission "investigation" concerning "monopolies" ordered by the President late in 1937. As is well known the FTC for years past has been attacking the basing point system.

Calling for "a thorough study of the concentration of economic power in American industry and the effect of that concentration upon the decline of competition," the President asked for "not less than $500,000" to make the study. He recommended that it be undertaken by the FTC, the Department of Justice and the Federal Securities and Exchange Commission.

The President also asked for $200,000 additional for the Department of Justice "to provide for the proper and fair enforcement of the existing anti-trust laws." In some quarters this latter recommendation was said to have in mind institution of new anti-trust suits against trade practices which the Administration condemns so bitterly. Though the President said the existing anti-trust laws are inadequate "because of new financial economic conditions with which they are powerless to cope," the assumption is that if such suits could not be pressed successfully under present laws, the Administration would fortify its action by the proposed wide revision of anti-trust laws.

Since the anti-trust investigation would be prolonged no legislative action at the present session of Congress was asked. Recommendations for action at the present session were confined to legislation directed against bank holding companies and investment trusts. The President said he had no intention of launching any ill-considered campaign of "trust busting" which lacked proper consideration for economic results.

The message was viewed by many as a "defense" message, a characteristic attempt to shift from the Administration to "big business" the responsibility for the industrial collapse and widespread unemployment. To this end the basic industries were once more made the whipping boys. By contrast small business, agriculture and labor were the object of sympathetic treatment and laudatory words. As usual not the slightest taint of blame for the depression was laid at the door of the Administration. So-called high prices were held to be due to absence of competition. No mention was made of the effect on prices of taxes built on New Deal policies. And as to wages, the President pointedly excluded them from criticism as a factor in prices of finished material! Said the President:

"One of the primary causes of our present difficulties lies in the disappearance of price competition in many industrial fields, particularly in basic manufacture where concentrated economic power is most evident—and where rigid prices and fluctuating payrolls are general.

"Managed industrial prices mean fewer jobs. It is no accident that, in industries like cement and steel where prices have remained firm in the face of a falling demand payrolls have shrunk as much as 40 and 50 per cent in recent months. Nor is it mere chance that in most competitive industries where prices adjust themselves quickly to falling demand, payrolls and employment have been far better maintained. By prices we mean, of course, the prices of the finished articles and not the wages paid to workers.

"When prices are privately managed at levels above those which would be determined by free competition, everybody pays."

Army Supply Bill Hits "Bottleneck"

WASHINGTON. — Chairman Sheppard of the Senate Military Affairs Committee has drafted a bill to empower the War Department to go ahead with educational orders, relaxing the present requirements for ordering supplies on an open competitive basis.

Sponsors point out, however, that under such a law bids will be asked in accordance with the Government's established procedure but that orders will be distributed among manufacturers equipped to furnish the required materials. It is all part of the War Department's general plans to remove a "bottleneck" standing in the way of adequate national defense preparations.

Officials of the department describe the bill as contemplating a "pilot" production authority rather than a "quantity" production authorization. The bill provides that the first educational orders may include gages, dies, jigs, tools, fixtures and other special aids, including drawings. In an emergency, the various manufacturers will have familiarized themselves with the Government requirement and be able to manufacture munitions or accessories on a production basis.

The Secretary of War would be given jurisdiction over contract awards, which also would require approval of the President.

Warehouse Men Have Plan For Mill Relationships

CLEVELAND.—A plan for mill-warehouse relationships, evolved after long discussion, will be presented at the 29th convention of the American Steel Warehouse Association, Inc., in New York, May 3 and 4. This plan will be proposed as a guide to both warehouse distributers and mill executives in formulating fundamental merchandising policies, according to W. S. Doxsey, executive secretary.

A.I.M.E.'s Pool 1937's Progress

(CONTINUED FROM PAGE 38)

Kauffman. In summarizing his figures, Mr. Kauffman stated that ingot molds may be divided into three classifications: (1) squares, (2) near squares, (3) slabs. A square necessarily has equal width to thickness ratio; a near square is defined as having its width, W, divided by its thickness, T, equal to 1.2 or less; and a slab has a W/T ratio greater than 1.2.

For square molds the sizes varied as follows, on the average: for 1926, the size was 22 3/16x22 3/16x76½ in.; 1937, 25⅝x25⅝x82¼ in. For near square molds, the average size in 1926 was 21⅛x23⅜x74¼ in., and for 1937 it was 23x25¼x75¼ in. For slab molds the average size in 1926 was 20¾x34½x73 11/16 in., whereas the average in 1937 was 23x42 15/16 x75⅝.

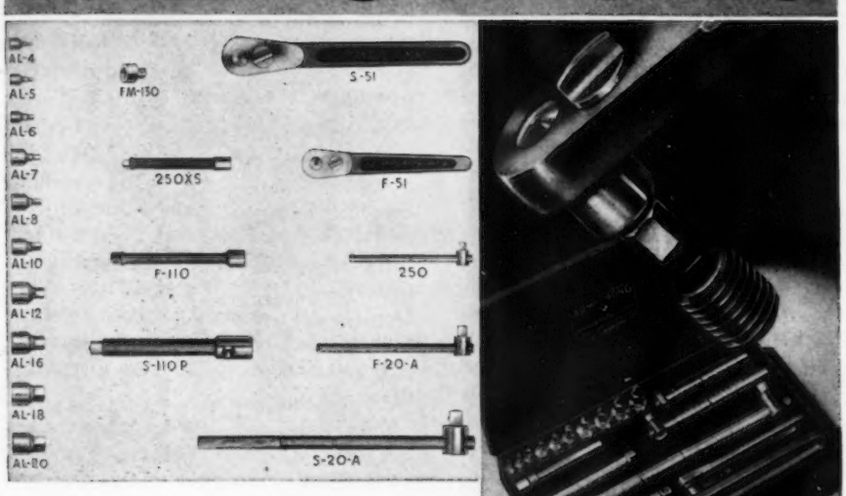
According to Mr. Kauffman in 1926 square molds accounted for 11.1 per cent of all molds, near squares 52.8 per cent, and slabs 36.1 per cent. In 1937, the square mold percentage had dropped to 4.7 per cent, near squares had dropped to 18.6 per cent, and slabs had mounted to 76.7 per cent.

Mr. Kauffman stressed the fact that the use of the rippled type mold, which includes the corrugated and fluted contours, was nil in 1926 for strip mill ingots, in 1937 the usage was considerably higher, but in between those two dates the usage reached a peak (possibly 1933) and later declined. Seemingly the rippled mold has to be used with caution, notably when tar coated, with respect to vertical skin or surface cracks. The rippled mold is more helpful with respect to transverse ingot cracks when it is not over-used, meaning that the maximum useful life of such molds may be, and frequently is, inferior to that of the plain or non-rippled type.

Molds of the big-end-up type, according to Mr. Kauffman, are as yet not in wide use in the strip ingot field largely because of the greater difficulty in handling them. But it seems that the big-end-up molds generally deliver somewhat higher ingot to slab yields than is the case with big-end-down types

Ed. Note: The remaining section of this A.I.M.E. open hearth committee report will appear in next week's issue, the subjects to be covered being a new type of salt candy for reducing heat exhaustion, a new mold coating, several exothermic powders for improving ingot quality and yield, a description of two new furnaces, a discussion on insulation results and technique, etc.

ARMSTRONG



Announcing!

ARMSTRONG HOLLOW SCREW WRENCHES

Heretofore dependent on "Wrenches" of bent lengths of hexagonal bar stock, hollow screw users can now assemble strong, handy, well balanced quality wrenches exactly suited for each job — ratchet wrenches, "T" wrenches, off-set wrenches, wrenches of almost any usable size or shape . . . wrenches that work in close quarters around dies and jigs, that reach into machinery and up to shafting . . . strong wrenches that will take a tight set.

Designed and made for severe lifetime service, ARMSTRONG Detachable Hollow Screw Wrenches are of special Chrome Vanadium Steel, machined to accurate limits, heat treated and tested to assure maximum strength. ARMSTRONG Reversible Ratchets are drop forged, have an improved instant-reverse action and hardened steel gears. Extensions and Handles are of Chrome Vanadium Steel. Larger wrenches and parts (½" drive) have the patented ARMSTRONG Drivelock feature that prevents heads or parts from separating. All wrenches and parts are chrome plated.

For shop use the ARMSTRONG Hollow Screw Wrench Set No. AL-100 (illustrated) is recommended. It comes in a fitted steel case and handles all hexagonal-socket hollow screw wrenches from ¼" to 1" diameters.

Stop "getting by" with makeshift tools. Write today for Hollow Screw Wrench Circular that describes and prices these quality tools that make work easier and faster and more profitable.

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ARMSTRONG TOOL HOLDERS Are Used in Over 90% of the Machine Shops and Tool Rooms

Electric Heat Treatment for the Modern Car

(CONTINUED FROM PAGE 39)

The axles pass through the furnaces on fixtures suspended through a slot in the respective furnace tops. Each fixture is attached to a keeled-shoe which is propelled along tracks over the furnace by means of a series of reciprocating pawls, all operated from bars connected to a hydraulic cylinder. Additional cylinders load and unload the elevators which carry the work into position to be passed under the gas-seal hood and up within the hood

to position for charging into the furnace. Other cylinders repeat this process in reverse at the discharge end of the furnace, discharging one fixture from the furnace to the inside elevator, which lowers the work into the quench, and then passes it on to the outside elevator, which lifts it into position to be passed onto tracks around to the draw furnace.

These cylinders are all activated by a pump located near the central control pulpit.

Heat is furnished in both furnaces by means of heavy cast chromium nickel grids fastened to the furnace side walls and along the furnace floors. The hardening furnace is thermally divided into three distinct heating zones, the draw furnace into four, each equipped with thermocouple, heat fuse and individual L. & N. control units.

Ten Years of Steel

(CONTINUED FROM PAGE 47)

of government, which had put no savings into the property and had taken no risk, received $8,000,000 more than the owners (from earnings), who had ventured their savings and thereby created nearly $3,000,000,000 in wages.

In the years 1928 and 1929 the earnings were high in comparison with taxes. During the years 1930-1936 inclusive, taxes in each year exceeded earnings. In 1937 with earnings of $94,944,358 the taxes were $88,048,237.

During the ten years 1928-1937 the taxes paid were equivalent to about one year and seven months' wages and salaries. Take the full record in round numbers:

In 1928 taxes equalled 1.5 months' wages and salaries.
In 1929 taxes equalled 1.6 months' wages and salaries.
In 1930 taxes equalled 1.5 months' wages and salaries.
In 1931 taxes equalled 1.6 months' wages and salaries.
In 1932 taxes equalled 3 months' wages and salaries.
In 1933 taxes equalled 2.3 months' wages and salaries.
In 1934 taxes equalled 2 months' wages and salaries.
In 1935 taxes equalled 1.8 months' wages and salaries.
In 1936 taxes equalled 1.8 months' wages and salaries.
In 1937 taxes equalled 2.4 months' wages and salaries.

It will be noted—and the point is one of great public significance—that during 1937, which for the first three quarters was an exceedingly prosperous year, with the hourly wage rates at the highest point on record, taxes took more months of wages and salaries than during the prosperous years 1928 and 1929.

TAKE taxes from the public angle. That is, what did they amount to per $100 of sales and other revenue? In 1928 the taxes in each $100 were $5.05; in 1929 they were $5.03; in 1930 they were $5.72; in 1931 they were $6.21; in 1932 they were $11.00; in 1933 they were $8.41 and in 1934 they were $8.46; in 1935 they were $7.59; in 1936 they were $6.68; and in 1937 they were $8.56.

The consideration of these factors leads us directly into prices. It is self-evident that United States Steel must find larger returns for owners or workers either in more efficient operation which will increase the "Balance Remaining" or in higher prices. But higher prices for products some-

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times deter demand and thus produce a smaller volume of receipts from the public, while efficiency is not an overnight affair and can usually be gained only by heavy capital expenditures—and the money for capital expenditures can be gained only from earnings or from the public.

Price System Rigid

If the corporation has no control over 50 per cent of the amount it receives, and if 84 per cent of the "Balance Remaining" must go for wages, its price system must be less than flexible—for its area of price discretion is negligible.

Our system of enterprise depends upon price flexibility. If all the principal factors are rigid, there can be no such flexibility.

The tabulation "How We Secured Our Funds" is self-explanatory. It shows that out of total receipts of $1,465,841,207 only $446,555,361 came from current operations. The balance came from prior earnings, from new financing or from reserves povided duing this period to take care of depreciation and other requirements.

IN the foregoing sections, the major developments of the past ten years have been set out. The single objective of all that has taken place during the decade has been to make over the corporation into an instrument of greater value to its owners, its workers and the public that it serves. That is a wholly admirable objective and in consonance with the corporation's place in the nation. That place is not entirely commercial—as I have before set out. There is a national aspect.

The presence of the corporation gives a measure of protection to the nation, both in peace and in war. For it is not without significance for the nation to have always at call the developed facilities of the corporation and always to be assured of its sympathetic and competent help.

To what extent have our objectives been attained? Is the corporation a better instrument than it was in 1928?

Public Attitude Changed

It is not enough to point to the change in the public attitude toward the corporation, for that must be in addition to its record as a commercial enterprise. Let us look at the commercial record. Because of the wide scope of the corporation's production, touching practically every field of endeavor, only an abnormal national economic condition would keep every division of the corporation fully occupied. Therefore it would not be normal for the corporation to have as high a rate of earnings as a steel company making only specialties during a period when the specialties were in great demand. On the other hand, the same reasons which would prevent the corporation from logically being the highest earner in a particular season ought to prevent it from ever being the lowest earner, and over the years the returns to the owners and the annual wages of the workers should be well above the average. The business of the corporation is diversified in the fashion in which insurance investments are diversified and for the same reason.

THE extraordinary economic condition which caused the country for several years to demand largely

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the lighter flat rolled products very seriously affected the corporation because it was not adequately equipped for these lighter products. The national demand is now broader and the corporation's higher rate of earnings in 1936 and 1937 was due, in part, to a change in the public economy which called for more of the heavier products. But the corporation would not have participated in the total business to the extent that it did, had not some of its new equipment already been functioning. Our essentially long-range planning has brought an improvement in short-range income.

The overall figures fairly tell the story. From 1928 through 1931, the corporation's participation in the business of the country on an ingot basis was higher than the percentage of its capacity to the capacity of the country. From 1932 through 1935, the corporation's participation was less than its relative capacity. That is, through those years it was losing some ground. The trend, however, was reversed in 1936 and the upward climb began. In 1937 the corporation fully maintained its competitive position. With 36.9 per cent of the nation's capacity, it furnished 37.2 per cent of the nation's requirements. This is particularly significant in view of the fact that much of the most important new production was not in action during 1937.

None of the goals as set have been reached. But the weight of the evidence—the record to date—is that they will be reached at the expected time.

* * *

In spite of adverse conditions, we have undertaken to make our corporation a more perfect instrument for the service which it performs and for the use of those of us who have worked or will hereafter work within it. The results of these efforts are apparent to all of us. We have had high peaks of production and of corresponding opportunity for employment and we have had deep valleys. These have tested the fibre of all of us, and, I believe, have welded us together in a strong and sympathetic group that feels real concern for one another's welfare and for the welfare of the corporation and will unite to continue the corporation great in every respect.

Out of these experiences and difficulties, there arises within me a great feeling of gratitude for the loyalty and the earnest cooperation that have been displayed throughout the corporation.

While I have always had the highest respect for men and women who work and labor, either singly or together, for a worthy objective and for the advancement of our country's well-being, the experiences of these years have raised that feeling to greater heights.

I am sure that there is in America today no body of men and women more loyal to the country and its interests or more loyal and self-sacrificing in the doing of their daily tasks than those men and women who labor in all the ranks of the United States Steel Corp. They are thorough Americans and I am proud to have worked with them.

THE END

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Sleeve BEARING HEADQUARTERS

FABRICATED STEEL

. . . Lettings advance to 21,230 tons from 16,325 tons last week . . . New projects slightly higher at 13,960 tons . . . Plate awards only 500 tons.

NORTH ATLANTIC STATES

AWARDS

3300 Tons, New York, Needle Trades school, to Bethlehem Steel Co., Bethlehem, Pa.

2250 Tons, Boston, Mass., General Hospital unit, to England Structural Co., Everett, Mass.

920 Tons, New York, alterations to Grand Central post office, to American Bridge Co., Pittsburgh; Taylor-Fichtor Steel Construction Co., New York, erectors.

900 Tons, Brooklyn, school No. 246, to Lehigh Structural Steel Co., Allentown, Pa.

380 Tons, New York, Gas Industries building at World's Fair, to Bethlehem Steel Co., Bethlehem, Pa.

230 Tons, Newark, N. J., addition to Mutual Benefit Life Insurance building, to Lehigh Structural Steel Co.

210 Tons, Newark, N. J., repairs to Doremus Avenue bridge, to Oltmer Iron Works, Jersey City, N. J.

180 Tons, New Haven, Conn., power house alterations, to Berlin Construction Co., Springfield, Mass.

165 Tons, Jersey City, N. J., shop and office building, to Selbach-Meyer Co., West New York, N. J.

110 Tons, Mooers, N. Y., Central School, to Vermont Structural Steel Co., Burlington, Vt.

110 Tons, galvanized cross arms for Pennsylvania Railroad electrification, to Lehigh Structural Steel Co., Allentown, Pa.

THE SOUTH

410 Tons, Chickamauga dam, Tenn., TVA gate towers, to Erie Steel Construction Co., Erie, Pa.

250 Tons, Coleman County, Tex., bridge, to Austin Brothers, Dallas, Tex.

185 Tons, Hinton County, Va., bridge, to American Bridge Co., Pittsburgh.

175 Tons, Owensboro, Ky., protection angles for United States Engineer, Louisville, to Kilby Car & Foundry Co., Anniston, Ala.

115 Tons, Runnels County, Tex., bridge, to North Texas Iron & Steel Co., Fort Worth, Tex.

110 Tons, Reeves and Loving Counties, Tex., bridge, to Austin Brothers, Dallas, Tex.

CENTRAL STATES

3000 Tons, Omaha, Neb., Dodge Street bridge, to Minneapolis Bridge Co., Minneapolis, Minn.

140 Tons, West Frankfort, Ill., bridge, to Michelmann Steel Construction Co., Quincy, Ill.

115 Tons, Saline County, Ill., bridge, to Eagle Iron Works, Terre Haute, Ind.

115 Tons, Trempealeau County, Wis., bridge, to Lakeside Bridge & Steel Co., Milwaukee.

100 Tons, De Pere, Wis., stadium, St. Norbert's College, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

WESTERN STATES

6383 Tons, Grand Coulee Dam, Wash., 40 sets of conduit linings and 80 102-in. ring-seal gates, awarded as follows: Items 1, 3, and 7, 3308 tons, to Consolidated Steel Co., Los Angeles; items 4 and 2, 3075 tons, to Joshua Hendy Iron Works, San Francisco. Other tonnage included in cast iron pipe.

1138 Tons, Cathlamet, Wash., Puget Island bridge over lower Columbia River, to Poole & McGonigle, Portland, Ore.

542 Tons, including machinery, Tacoma, Wash., Hylebos Waterway bridge, to Pacific Car & Foundry Co., Seattle.

250 Tons, Boulder City, Nev., transmission towers for Southern California-Edison Co. transformer circuit, to Bethlehem Steel Co., Bethlehem, Pa.

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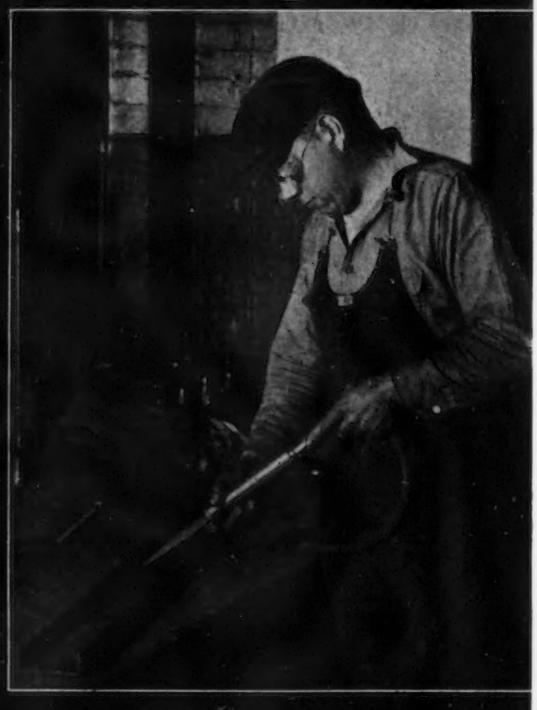
B1 SCALING TOOL

Ideal for Peining Bead When You Want a Smooth Finished Job



Here is a scaling tool that is new—different—better. The handiest thing yet for peining bead when you want a smooth finished job; for cleaning off weld splatter; for undercutting when overlapping is necessary. Cleans off rust, scale and old paint like nobody's business. Exactly the power and speed you want by pressing handle easy or hard. Swivel air connection prevents twisted hose. Chisel can't loosen or turn, yet releases at a touch. Exhaust blows chips and scale off work.

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BRANCHES IN PRINCIPAL CITIES

225 **Tons,** Hewitt Station, Los Angeles County, Calif., undercrossing, to Consolidated Steel Co., Los Angeles.

135 **Tons,** Hollywood, Calif., Legion Stadium, to Bethlehem Steel Co., Los Angeles.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

350 **Tons,** Concord, N. H., State office building.

370 **Tons,** New York, Fulton Fish Market.

280 **Tons,** Burt, N. Y., Niagara County bridge; Earl L. Harrington, general contractor.

272 **Tons,** New York, Wards Island sewage treatment plant, section 5, contract 22; bids to Department of Public Works until May 17.

230 **Tons,** Gardiner, N. Y., State highway bridge RC-3941.

200 **Tons,** Bennington, Vt., State bridge.

200 **Tons,** New York, W. 238th Street bridge.

190 **Tons,** Brentwood, Pa., Sceneridge apartment building.

130 **Tons,** Valley Stream, N. Y., school, Holy Name of Mary Parish.

120 **Tons,** New York, World's Fair building for American Tobacco Co.

100 **Tons,** New York, R.C.A. building at World's Fair.

THE SOUTH

3000 **Tons,** Vinita, Okla., Grand River dam; bids June 3.

375 **Tons,** Chattanooga, Tenn., rail support towers, TVA.

350 **Tons,** Alexandria, La., Kress store.

187 **Tons,** Springer, N. M., bridge.

185 **Tons,** Chattanooga, Tenn., tube gates, TVA.

CENTRAL STATES

10,000 **Tons,** Cleveland, Main Street bridge superstructure and railing; R. C. Mahon Co., Detroit, low bidder, at $1,419,370.

1300 **Tons,** Cleveland, State elevated clover leaf highway intersection near Willow; plans out soon.

1278 **Tons,** Lacon, Ill., Marshall County state bridge. Illinois Steel Bridge Co. low bidder.

1000 **Tons,** Milwaukee, Cherry Street bascule span; bids about July 15.

900 **Tons,** Chicago, office building, Chicago Park district.

800 **Tons,** Chicago, completion of Soldier's Field project; bids May 20.

400 **Tons,** Chicago, manufacturing building, Lasker Boiler & Engineering Co.

370 **Tons,** Lincoln, Neb., state project FAGM-1, subway.

236 **Tons,** Troy, Ill., Madison County bridge, Duffin Iron Works low bidder.

180 **Tons,** Green Bay, Wis., steam power plant, Northwestern Paper Co.

150 **Tons,** Springfield, Mo., highway bridge; bids May 6.

130 **Tons,** Pawnee City, Neb., state overhead bridge, project FAS-19.

115 **Tons,** Green Bay, Wis., Baird Street bridge; bids taken May 2.

112 **Tons,** Detroit, addition to plant No. 7, Murray Corp. of America, general contract bids taken.

WESTERN STATES

1250 **Tons,** Odair, Wash., stop log guides, Grand Coulee dam; bids May 20.

750 **Tons,** San Francisco, trusses and beams for Forts Funston and Cronkhite by United States Engineer (Invitation 868-38-134); J. H. Pomeroy & Co., Inc., low bidder on erection.

FABRICATED PLATES

AWARDS

210 **Tons,** Saltville, Va., Mathieson Alkali Works, four welded steel tanks, to Chicago Bridge & Iron Works, Chicago.

150 **Tons,** Memphis, Tenn., dredge pipe, to an unnamed bidder.

140 **Tons,** Cameron, La., Superior Oil Co., tanks, to Wyatt Metal & Boiler Works, Dallas, Tex.

NEW PROJECTS

750 **Tons,** Town of Lake, Milwaukee County, Wis., 1,000,000-gal. elevated steel water tank; bids May 17.

135 **Tons,** New York, Wards Island sewage treatment plant, section 5, contract 22; bids received by Department of Public Works until May 17.

SHEET PILING

NEW PROJECTS

130 **Tons,** New York, Wards Island sewage treatment plant, section 5, contract 22; bids received by Department of Public Works until May 17.

AMPLE Chip Clearance

GAIRING LOCK

CORE DRILLS never get muscle-bound!

GAIR-LOCKED Blades provide ample chip clearance -- no clogging of chips in flutes. That's important, for instance, in core drills for rough boring cored holes in castings or forgings -- cast iron, malleable or steel.

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The Gairing Tool Co., Detroit, Mich.

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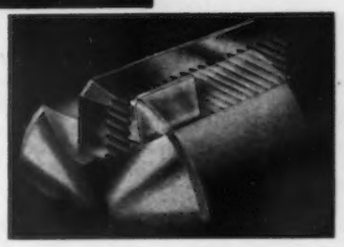


Blade GAIR-LOCKED in position in cutter head. Patent applied for.

Capital Goods Activity in April Lowest Since November, 1934

THE IRON AGE Weekly Index of Capital Goods Activity

(1925-27 = 100)

	Week Ended Apr. 30	Week Ended Apr. 23	Comparable Week 1937	Comparable Week 1929
Steel ingot production	39.3	39.4	115.7	126.5
Automobile production	41.9	49.1	117.2	128.7
Construction contracts	66.8	70.2	57.2	127.9
Forest products carloadings	42.6	44.9	96.8	117.5
Production and shipments, Pittsburgh District	48.4	50.7	103.9	123.5
Combined index	47.8	50.9	98.2	124.8

A PRONOUNCED weakness in every component of THE IRON AGE seasonally adjusted index of capital goods production and distribution brought the index for the week ended April 30 down to 47.8 per cent of the 1925-27 average, the lowest level recorded in any week since the first week in December, 1934. In the week previous the index stood at 50.9, in a comparable week a year ago it was 98.2, and the comparable week in 1929 showed the index at 124.8, as indicated by the table above.

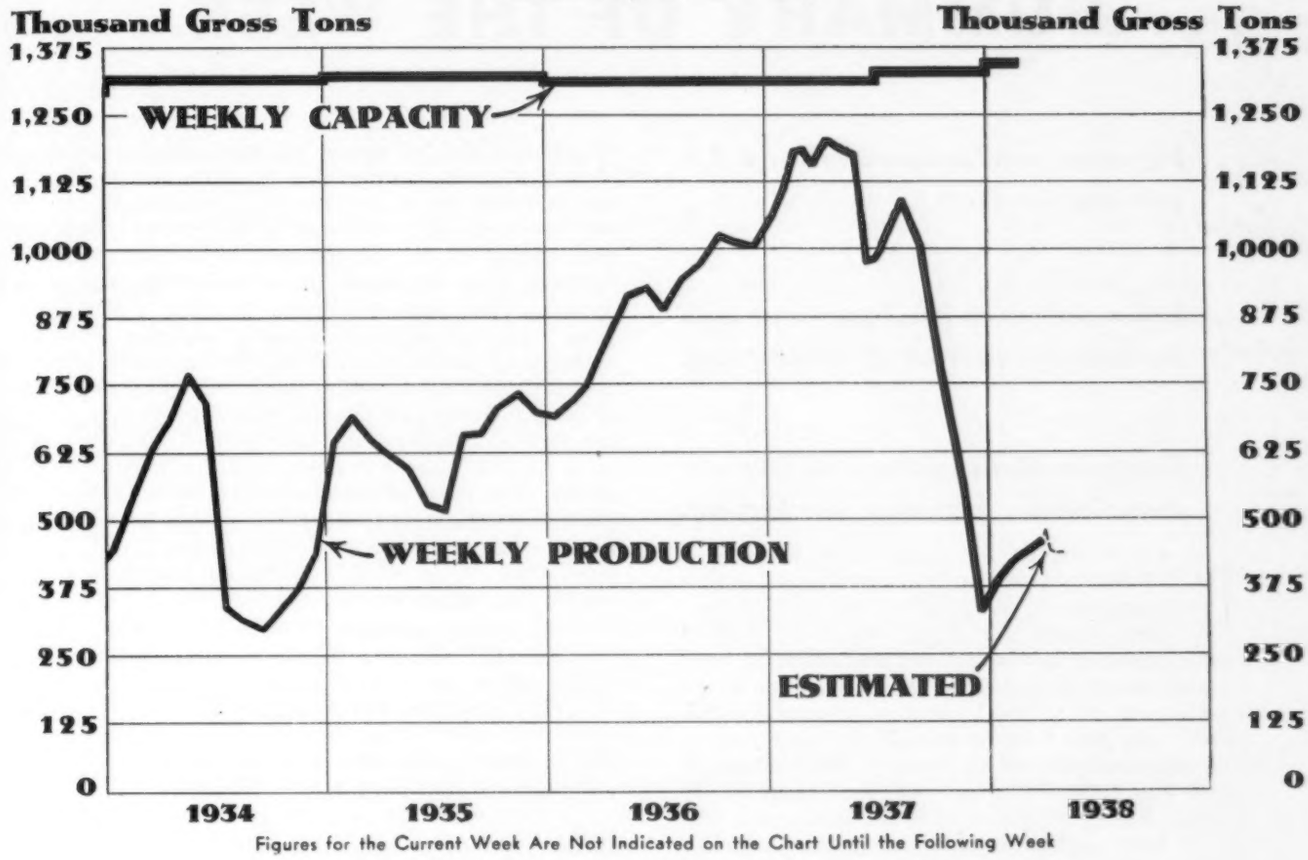
The index opened the month at 54.4, but in the face of declines in automobile and steel ingot production against a rising seasonal trend, it declined steadily during the month, ending the period at 47.8, a drop of 14 per cent. The weighted average index for April is 50.6, the lowest monthly figure since November, 1934. This figure compares with the revised index for March of 53.7, and 93.7 for April, 1937.

The automobile series showed the greatest decline of the week, dropping 7.2 points as assemblies sagged to 50,775 units from 60,563 in the preceding week. Industrial production and originating shipments in the Pittsburgh area fell to a new low for the current recession and is at a level equal to December, 1934, according to the Bureau of Business Research, University of Pittsburgh. The adjusted index of this component now stands at 48.4, as compared with 53.4 a month ago and 103.9 a year ago. The slight gain in the dollar volume of private awards for the week was insufficient to overcome the week's drop in the volume of public awards with the consequence that the adjusted index for this series declined to 66.8 from 70.2 a week ago.

Components of The Index (1) Steel Ingot Production Rate, from THE IRON AGE; (2) Automobile Production, from Ward's Automotive Reports; (3) Revenue Freight Carloadings of Forest Products, from Association of American Railroads; (4) Industrial Productive Activity in Pittsburgh District, from Bureau of Business Research of University of Pittsburgh; (5) Heavy Construction Contract Awards, from *Engineering News-Record*.

Steel Ingot Output Declines to 30.5 Per Cent

Average Weekly Production of Open-Hearth and Bessemer Steel Ingots by Months, 1934-1937, and Estimated Production by Weeks in 1938



Figures for the Current Week Are Not Indicated on the Chart Until the Following Week

STEEL INGOT PRODUCTION BY DISTRICTS: Per Cent of Capacity

	Current Week	Last Week
Pittsburgh	26.0	26.0
Chicago	34.0	34.0
Valleys	29.0	25.0
Philadelphia	27.0	27.0
Cleveland	21.0	24.0
Wheeling	59.0	68.0
Buffalo	26.5	31.0
Detroit	19.5	19.5
Southern	49.0	49.0
S. Ohio River	40.0	38.0
Western	30.0	30.0
St. Louis	42.0	42.0
Eastern	10.0	50.0
Aggregate	30.5	32.0

Weekly Booking of Construction Steel

	Week Ended				Year to Date	
	May 3, 1938	Apr. 26, 1938	Apr. 5, 1938	May 4, 1937	1938	1937
Fabricated structural steel awards	21,230	16,325	16,650	18,850	240,530	449,145
Fabricated plate awards	500	1,500	1,995	1,095	49,370	56,520
Steel sheet piling awards	0	0	890	970	10,425	16,525
Reinforcing bar awards	2,160	10,630	1,235	2,760	73,675	65,745
Total Lettings of Construction Steel	23,890	28,455	20,770	23,675	374,000	587,935

. . . .SUMMARY OF THE WEEK. . . .

. . . Pig iron production declined 2.1 per cent in April.

° ° °

. . . Ingot output at 30.5 per cent with no sign of reversal of downtrend.

° ° °

. . . Southern Railway buys 5550 cars; automobile industry slackening.

THE downward trend of steel plant and foundry consumption of pig iron is borne out by production figures for April, which on a daily basis showed a loss of 2.1 per cent, with an even greater reduction indicated for May owing to the blowing out of 11 blast furnaces during the past month. On May 1 there were 79 furnaces operating, compared with 90 on April 1. Total output in April was 1,376,141 gross tons, against 1,452,487 tons in March. The daily average last month was 45,871 tons against 46,854 tons in the preceding month. Not since 1934 has the production of pig iron fallen so low.

No reversal of the downward trend in pig iron or steel ingot production is yet in sight. Orders and inquiries for various steel products are either barely holding at recent levels or are declining. Ingot output for the industry is estimated at 30.5 per cent for the current week, decreases having occurred in a number of districts, including Wheeling-Weirton, where the drop was from 68 to 59 per cent; at Cleveland, where a loss of four points brings the rate down to 21 per cent; and at Buffalo, where the decline was from 31 to 26.5 per cent. Operations are fairly steady at Pittsburgh and Chicago, and up slightly in the Youngstown area and in southern Ohio.

The most favorable news of the week is the placing of orders for 5550 freight cars by the Southern Railway. These cars were divided among several equipment builders, as follows: Pullman Standard Car Mfg. Co., 2000; Mt. Vernon Car Mfg. Co., 1250; American Car & Foundry Co., 1250; Pressed Steel Car Co., 700; Ralston Steel Car Co., 250; and Greenville Steel Car Co., 100. While the Southern is the first road to make use of RFC equipment loans on a large scale under the new program, there is no indication as to how generally the railroads will avail themselves of Government aid.

THE question of prices of steel products has been sharply injected into the situation within the past week from two sources. President Roosevelt in his monopoly message to Congress declared that "proof by the Government of identical bids, uniform price increases, price leadership, higher domestic than export prices, or other specified price rigidities might be accepted as prima facie evidence of unlawful actions." He mentioned the steel and cement industries specifically. The action of the American Can Co. in sending a letter to its customers charging that concessions were being made on tin plate has also focused attention on prices. Tin plate producers do not admit having made concessions to competitors of the American Can Co., and whether this situation will result in a reduction in the official price of tin plate has not yet become apparent.

Scrap prices continue to recede in some districts, heavy melting steel having declined 50c. at Philadelphia and Cleveland and $1 at Youngstown. The Pittsburgh and Chicago prices are unchanged. THE IRON AGE composite price has dropped to $11.75, lowest since 1935 and only $1.42 above the minimum of that year.

THE automobile industry is experiencing a slackening in sales and production. Shutdowns of some plants are probable within the very near future. Meanwhile revisions have been made in projected model changes in 1939 cars which will eliminate the purchase of a large amount of machine tool equipment that would have been required for more extensive alterations.

Structural steel lettings were upward of 21,000 tons in the week, including about 6300 tons for Grand Coulee Dam, 3300 tons for the Needle Trades School in New York, 3000 tons for a bridge in Omaha and 2250 tons for a hospital in Boston. New projects out for bids total about 14,000 tons, of which 3000 tons is for a dam in Oklahoma, 1300 tons for an elevated highway in Cleveland, 1250 tons for Grand Coulee Dam work and 1000 tons for a bridge in Milwaukee. Inquiries for reinforcing steel bars are about 15,500 tons, one job, a dam in Oklahoma, calling for 9000 tons.

Four boats awarded to a Florida shipyard by the Maritime Commission will take 15,000 tons of steel, and 12 others on which bids were opened Tuesday call for 45,000 tons. Navy destroyers and submarines, on which bids will be taken June 22, will require about 15,000 tons of steel, including work to be done in both private and Navy shipyards. Two battleships, on which bids will be requested in the summer, will use 20,000 tons of carbon steel plates, shapes and bars.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	May 3, 1938	Apr. 26, 1938	Apr. 5, 1938	May 4, 1937
Rails, heavy, at mill	$42.50	$42.50	$42.50	$42.50
Light rails, Pittsburgh	43.00	43.00	43.00	43.00
Rerolling billets, Pittsburgh	37.00	37.00	37.00	37.00
Sheet bars, Pittsburgh	37.00	37.00	37.00	37.00
Slabs, Pittsburgh	37.00	37.00	37.00	37.00
Forging billets, Pittsburgh	43.00	43.00	43.00	43.00
Wire rods, Nos. 4 and 5, P'gh	47.00	47.00	47.00	47.00
		Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	2.10	2.10	2.10	2.10

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	2.45	2.45	2.45	2.45
Bars, Chicago	2.50	2.50	2.50	2.50
Bars, Cleveland	2.50	2.50	2.50	2.50
Bars, New York	2.81	2.81	2.81	2.78
Plates, Pittsburgh	2.25	2.25	2.25	2.25
Plates, Chicago	2.30	2.30	2.30	2.30
Plates, New York	2.55	2.55	2.55	2.53
Structural shapes, Pittsburgh	2.25	2.25	2.25	2.25
Structural shapes, Chicago	2.30	2.30	2.30	2.30
Structural shapes, New York	2.52	2.52	2.52	2.5025
Cold-finished bars, Pittsburgh	2.90	2.90	2.90	2.90
Hot-rolled strips, Pittsburgh	2.40	2.40	2.40	2.40
Cold-rolled strips, Pittsburgh	3.20	3.20	3.20	3.20
Hot-rolled annealed sheets, No. 24, Pittsburgh	3.15	3.15	3.15	3.15
Hot-rolled annealed sheets, No. 24, Gary	3.25	3.25	3.25	3.25
Sheets, galv., No. 24, P'gh	3.80	3.80	3.80	3.80
Sheets, galv., No. 24, Gary	3.90	3.90	3.90	3.90
Hot-rolled sheets, No. 10, Pittsburgh	2.40	2.40	2.40	2.40
Hot-rolled sheets, No. 10, Gary	2.50	2.50	2.50	2.50
Cold-rolled sheets, No. 20, Pittsburgh	3.45	3.45	3.45	3.55
Cold-rolled sheets, No. 20, Gary	3.55	3.55	3.55	3.65
Wire nails, Pittsburgh	2.75	2.75	2.75	2.75
Wire nails, Chicago dist. mill	2.80	2.80	2.80	2.80
Plain wire, Pittsburgh	2.90	2.90	2.90	2.90
Plain wire, Chicago dist. mill	2.95	2.95	2.95	2.95
Barbed wire, galv., P'gh	3.40	3.40	3.40	3.40
Barbed wire, galv., Chicago dist. mill	3.45	3.45	3.45	3.45
Tin plate, 100-lb. box, P'gh	$5.35	$5.35	$5.35	$5.35

Pig Iron

Per Gross Ton:	May 3, 1938	Apr. 26, 1938	Apr. 5, 1938	May 4, 1937
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.84	$25.76
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	23.89	23.89	23.89	23.69
No. 2, Birmingham†	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago*	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.26
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago*	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	30.34	30.34	30.24	30.04
Ferromanganese, seab'd, carlots	102.50	102.50	102.50	95.00

†This quotation is subject to a deduction of 38c. a ton for phosphorus content of 0.70 per cent of higher.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$11.75	$11.75	$13.00	$20.25
Heavy melting steel, Phila.	*12.25*	12.75	13.75	19.75
Heavy melting steel, Ch'go	11.25	11.25	11.75	18.75
Carwheels, Chicago	13.00	13.00	13.50	20.25
Carwheels, Philadelphia	14.75	14.75	15.75	21.25
No. 1 cast, Pittsburgh	14.25	14.25	14.75	20.25
No. 1 cast, Philadelphia	15.25	15.25	15.75	22.00
No. 1 cast, Ch'go (net ton)	10.75	10.75	11.25	16.25
No. 1 RR. wrot., Phila.	15.25	15.25	15.25	19.75
No. 1 RR. wrot., Ch'go (net)	8.75	8.75	9.25	16.25

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$4.00	$4.00	$4.00	$4.60
Foundry coke, prompt	5.00	5.00	5.00	5.25

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, Conn.	10.00	10.00	10.00	14.00
Lake copper, New York	10.125	10.125	10.125	14.12½
Tin (Straits), New York	*34.80*	37.75	38.10	56.00
Zinc, East St. Louis	*4.15*	4.25	4.15	6.75
Zinc, New York	*4.54*	4.64	4.54	7.10
Lead, St. Louis	4.35	4.35	4.35	5.85
Lead, New York	4.50	4.50	4.50	6.00
Antimony (Asiatic), N. Y.	15.25	15.25	15.75	15.25

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
May 3, 1938	2.605c. a Lb.	$23.25 a Gross Ton	$11.75 a Gross Ton
One week ago	2.605c.	23.25	11.92
One month ago	2.605c.	23.25	12.58
One year ago	2.605c.	23.25	19.58

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1938					$14.00, Jan. 4	$11.75, May 3
1937	2.605c., Mar. 9	2.330c., Mar. 2	$23.25, Mar. 9	$20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 16
1936	2.330c., Dec. 28	2.084c., Mar. 10	19.73, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.130c., Oct. 1	2.124c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 23
1934	2.199c., Apr. 24	2.008c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	2.015c., Oct. 3	1.867c., Apr. 18	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	2.037c., Jan. 13	1.945c., Feb. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., Apr. 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 17	13.08, Nov. 22

. . . PITTSBURGH . . .

. . . Southern Railway orders 5550 freight cars requiring 75,000 tons of steel . . . Ingot production unchanged at Pittsburgh, lower in Wheeling-Weirton area.

PITTSBURGH, May 3.—Steel ingot output in the Pittsburgh district this week is unchanged at 26 per cent of capacity. The Wheeling-Weirton district has dropped nine points to 59 per cent. Ingot operations are being kept in line with new business as far as possible, although in some cases raw steel stocks accumulate with the result that operations are changed slightly to dissipate this inventory.

Incoming business during April was about 10 to 20 per cent below March bookings but with one less working day in April orders on a daily basis were changed but little.

The Southern Railway ordered 5550 freight cars this week subject to ICC approval, an increase of 550 cars over its recent inquiry. About 75,000 tons of steel will be required in the construction of these cars.

Steel bookings during the past week were about on a par with those of the previous week with no indication of a definite trend.

No. 1 heavy melting steel is unchanged at $11.50 to $12.

Pig Iron

Although total pig iron sales in April were about the same as in March, a greater number of buyers were in the market, suggesting further paring of inventories. Current business continues dull. While some pressure has been exerted for lower prices, they continue firm.

Semi-Finished Steel

April business was about in the same volume as that of March but weekly sales figures continue irregular.

Bars, Plates and Shapes

A slight improvement in bar orders developed in the past week. Structural inquiries and awards were less numerous than a week ago and for the most part involve spending of public money. American Bridge Co., Pittsburgh, will furnish 920 tons of plates and shapes for alterations to New York's Grand Central post office.

Reinforcing Bars

Reinforcing bar inquiries and awards were comprised almost entirely of publicly financed projects and were about the same in number this week as a week ago.

Sheets and Strip

Sheet demand continues to move sideways with total business in the past week increased slightly from the previous week. On a daily basis April business was about on a par with March bookings. Major support continues to be miscellaneous demand.

Wire

Total wire sales in April ran about 10 to 13 per cent behind March on a daily basis. Merchant wire demand continues slowly downward while manufacturers' wire bookings again show slight increases.

Tubular Goods

Little if any change in the volume of tubular goods business has occurred in the past week. Total bookings in April were less than those in March, but with one less working day in April tonnages on a daily basis were practically unchanged.

Tin Plate

Tin plate operations continue at 55 per cent while specifications are about in the same volume as a week ago. General line can orders continue to be influenced by general business conditions. The recent American Can Co. letter to its customers regarding some shading in tin plate prices is interpreted generally as a move to protect its customers against any change in the current market price of cans.

Railroad Buying

Southern Railway has placed orders for 5550 freight cars, an increase of 550 over its recent inquiry. The cars were distributed as follows: 2000 box cars to Pullman Standard Car Mfg. Co.; 1000 box, 200 furniture and 50 65-ft. gondolas to Mt. Vernon Car Mfg. Co.; 1250 high-side gondolas to American Car & Foundry Co.; 700 low-side gondolas to Pressed Steel Car Co.; 250 stock cars to Ralston Steel Car Co., and 100 flat cars to Greenville Steel Car Co.

REINFORCING STEEL

AWARDS

617 Tons, Flint, Mich., water softening works, to Inland Steel Co., Chicago.

500 Tons, New York, Queens land section Queens-Manhattan East River tunnel, to Bethlehem Steel Co., Bethlehem, Pa.

200 Tons, Portland, Conn., State road to Truscon Steel Co. and Concrete Steel Co., Boston.

180 Tons, Rutledge, Tex., Colorado River project (Invitation 46560-A), to Laclede Steel Co., St. Louis.

160 Tons, Norfolk, Va., grade school, to Hall-Hodges Co., Norfolk, Va.

140 Tons, Avon, Conn., State road, to American Steel & Wire Co., Worcester, Mass.

135 Tons, Louisville, Ky., sewer, W. L. Hailey & Co., contractor, to Colonial Supply Co., Cincinnati.

100 Tons, Benton Harbor, Mich., waterworks, to Ceco Steel Products, Omaha, Neb.

125 Tons, Plymouth, Wis., City Hall, to Calumet Steel Co., Chicago.

NEW REINFORCING BAR PROJECTS

9000 Tons, Vinita, Okla., Grand River dam; bids June 3.

1700 Tons, Washington, Wood & Lothrope warehouse.

1000 Tons, New York, sewer in Bronx.

600 to 700 Tons, Imola, Calif., six buildings at State hospital; bids May 17.

492 Tons, Newton, Conn., State hospital.

400 Tons, Akron, Ohio, Market Street sewer; bids May 10.

380 Tons, Springfield, Mass., flood protection works.

290 Tons, Chicago, Winnemac Garden apartments.

284 Tons, San Francisco, United States Engineer for delivery at Fort Funston; bids May 5.

250 Tons, New York, Wards Island sewage treatment plant, section 5, contract 22; bids received by Department of Public Works until May 17.

235 Tons, Cleveland, land piers for Main Street bridge; A. J. Forschner Co., Chicago, low bidder.

230 Tons, Norwalk, Conn., State road.

190 Tons, Hamden-North Haven, Conn., State road.

150 Tons, Chicago, S. Laramie Avenue underpass.

125 Tons, Chicago, Notre Dame High School.

100 Tons, Fort Wayne, Ind., Central High School.

100 Tons, Fort Wayne, Ind., Southwest High School.

100 Tons, Green Bay, Wis., Northern Paper Mills Co. building.

. . . . CHICAGO . . . .

. . . Ingot production unchanged at 34% . . . Trend of sales and inquiries is slightly downward . . . No upturn expected before late summer at the earliest.

CHICAGO, May 3.—Ingot output is unchanged this week, district mills continuing to operate at an average of 34 per cent of capacity.

Little change is noticeable in the trend of sales, but what few indications are available point downward, the volume of inquiries and orders falling to a slight degree in the past week. The general picture as concerns consuming industries likewise is unchanged in an important sense. No upturn is indicated from the automobile or railroad fields until late summer at the earliest, while construction awards are coming in haphazardly with no regularity or assurance of continuation. Sales to the farm equipment makers, which have highlighted the entire spring and winter seasons, are lessening slightly, but this group is still a major factor in the tonnage recorded in local sales offices.

Railroad steel sellers believe a fair tonnage will result from the carriers if the proposed pay cut of $250,000,000 is agreed to by the brotherhoods, as this will enable many roads to improve their net earnings position considerably.

A report in the daily press here today states that Administration leaders are in favor of a $10,000,000 Federal grant for the construction of a loop subway and a $9,400,000 grant for a South Side filtration plant, if and when funds are available.

Scrap prices are unchanged, with heavy melting steel quoted at $11 to $11.50 a gross ton delivered.

Pig Iron

April shipments were off from those of March, as was also the case with foundry coke. Low inventories are gradually being replenished, spot sales for this purpose being confined mostly to carloads. Present outlook for the summer is none too bright and the trend already is edging downward.

Wire and Wire Products

The peak of the spring demand for merchant products from the farm districts apparently has been reached, and activity in this field seems to be lessening. Sales exceeded expectations according to one seller, but the poor showing of the manufacturing lines at the same time held down optimism. No further improvement is expected before fall.

Shapes and Reinforcing Bars

The 3000-ton Dodge Street bridge contract in Omaha has been awarded to Minneapolis Bridge Co., but it is understood that all financial difficulties have not yet been solved and that this work probably will not go ahead for some time. Other awards and inquiries, both in shapes and bars, were mostly public work.

Plates

Miscellaneous orders from fabricators are supporting this market as railroad and other industrial demand continues light. Interest in pipe is being maintained and oil country goods are active.

Sheets, Strip and Tin Plate

With no upward trend in the automobile industry, the position of cold-rolled sheets in unchanged, deliveries being promised in two to three weeks. Galvanized sheets require about three weeks for delivery and are in relatively good demand. The most active consuming groups both in sheets and strip are the manufacturers of farm equipment and general users. Tin plate business is fairly good, some mills here operating nearly at capacity. Some foreign business has been received in this district, but it is said that the prices necessary to obtain such orders are too low for profit.

Bars

The current lethargy of this market reflects accurately the condition of the chief factors in its maintenance, the automobile, railroad, machine tool and construction industries. With deliveries practically prompt, the little demand in evidence comes from jobbers, diversified consumers and the farm implement and tractor makers.

Machine Tool Builders Hold Annual Meeting In Chicago

CHICAGO.—More than 150 machine tool builders and their representatives attended technical meetings and discussed general problems affecting the industry at the 36th spring convention of the National Machine Tool Builders' Association, at the Edgewater Beach Hotel, Chicago, early this week.

Among the speakers at the general sessions were Norman D. MacLeod, president Abrasive Machine Tool Co., East Providence, R. I.; William J. Kelly, president Machinery and Allied Products Institute; L. W. Scott Alter, president, American Tool Works Co., Cincinnati; J. Y. Scott, executive vice-president Van Norman Machine Tool Co., Springfield, Mass.; Henry C. Pierle, secretary, R. K. Le Blond Machine Tool Co., Cincinnati; A. G. Bryant, president Associated Machine Tool Dealers; J. E. Lovely, vice-president and chief engineer Jones & Lamson Machine Co., Springfield, Vt.; B. N. Foster, chief engineer Kingsbury Machine Tool Corp., Keene, N. H.; Frida F. Selbert, secretary of the association; Louis Johnson, Assistant Secretary of War; Walter W. Tangeman, vice-president, Cincinnati Milling Machine Co., Cincinnati, and Clayton R. Burt, president Pratt & Whitney Division of Niles-Bement-Pond Co., Hartford, Conn.

Of unusual interest was the dinner address Monday evening by Malcolm W. Bingay, editorial director, Detroit *Free Press*, titled "All Eyes on Washington."

Myron C. Taylor to Aid Refugees from Europe

MYRON C. TAYLOR, former chairman of the United States Steel Corp., in company with Mrs. Taylor, sailed from New York last Saturday as the American representative on the international government committee which will aid refugees exiled from Germany and Austria. His appointment was announced following a conference Mr. Taylor held with President Roosevelt on Friday. Mr. Taylor first will go to Florence, Italy, where he has a villa, and expects to return Aug. 1.

. . .CINCINNATI. . .

. . . *Orders for sheets show no definite trend.*

CINCINNATI, May 3.—The district sheet steel market continues to move within narrow limits, current demand being just slightly below the year's peak. New business is averaging between 25 to 30 per cent of mill capacity, with no indication of trend. Bookings of galvanized sheets are almost in seasonal proportions. Automotive ordering fluctuates, but is definitely below normal expectations. Refrigerator and stove manufacturers are holding commitments to conservative levels in keeping with general business conditions. Inquiry is almost nil since consumers show no fear of being able to obtain material when needed. Prices in this district are being well maintained.

Shipments of pig iron were lighter the past month than in March. New business is almost nil and consists of occasional orders for immediate use. While there has been a small increase in the melt of heating equipment manufacturers, this has only tended to take up the slack in other foundry operations.

Ingot production is up a few points to about 35 per cent this week. All interests are running some open hearths with a district total of 13 out of 34 in production.

. .BIRMINGHAM. .

New steel business at a fair rate . . . Plates and shapes in best demand.

BIRMINGHAM, May 3.—New steel tonnage continues to flow in at a fair rate, and production is also steady. New business is mostly in small lots and distributed among all general products. Demand for plates and structural is the most active. Twelve open hearths have been worked for some weeks past, and the schedule is unchanged for this week. Six are at Fairfield, three at Ensley and three at Gadsden.

The pig iron market is still dragging, with foundries ordering iron only as needed. There has been a decrease in blast furnace operations to 11. The Tennessee Coal, Iron & Railroad Co. blew out an Ensley furnace, which had been on recarburizing iron.

At an Ensley industrial dinner last week Robert Gregg, president of the Tennessee Coal, Iron & Railroad Co., stated that Birmingham could look forward to a continuation of the present high level of steel production for some time to come.

The Bessemer plant of the Pullman-Standard Car Mfg. Co. has received an order for 2000 steel freight cars from the Southern Railway.

Decatur, Ala., will open bids May 10 for the construction of an electric distribution system. Courtland, Ala., will also open bids May 25 for such a system.

. .SAN FRANCISCO. .

Grand Coulee Dam awards of 10,500 tons of fabricated steel and cast iron.

SAN FRANCISCO, May 2.—Five long-pending public projects, requiring approximately 10,500 tons of fabricated iron and steel, were awarded last week. Although these awards were the largest group this year, they mark an accumulation of past business rather than an acceleration of market demand.

Grand Coulee Dam accounted for the majority of the tonnage with the award of 40 sets of conduit linings and 80 102-in. ring-seal gates. Total net tonnage, the majority of it steel castings and portions cast iron, is 8383 tons. Successful bidders were Consolidated Steel Co., Los Angeles, 3308 tons; Joshua Hendy Iron Works, San Francisco, 3075 tons; and U. S. Pipe & Foundry Co., Burlington. N. J., 2000 tons. This was the second major Grand Coulee award in which land grant rate advantages have not proved sufficient to bring success to Eastern bidders.

The Puget Island Washington State highway bridge, requiring 1138 tons of steel, is unofficially reported as awarded to Poole & McGonigle, Portland, Ore. Another Washington highway bridge over Hylebos Waterway, Tacoma, is reported to have been awarded to Pacific Car & Foundry Co., Seattle. Tonnage is 542, including machinery.

Reinforcing bar prospects continue good; the largest new inquiry is for 600 to 700 tons for State hospital buildings at Imola, near Napa, Cal. This branch of the industry is especially active at present in the Los Angeles territory.

. . . .ST. LOUIS. . . .

. . . *Grand River Dam to take 12,000 tons of steel.*

ST. LOUIS, May 3.—The application of the Wabash Railway to lay 10,000 tons of 112-lb. rail, including 5750 tons to be purchased and 4250 tons on hand, and to make general repairs to and install non-harmonic truck springs on 300 box cars was passed for hearing by United States District Judge Davis here from last Friday to next Friday.

Interest is being shown here in the Grand River Dam, bids for which will be opened at Vinita, Okla., on June 3. The project will require 9000 tons of reinforcing bars and 3000 tons of structural shapes. Bids will be opened next Friday for a highway bridge at Springfield, Mo., which will require 150 tons of structural.

Buying of sheets and bars continues light, with purchases limited to immediate needs.

Reports from the stove manufacturing interests are that their operations are improved. In Belleville, the foundries are operating three to four days a week. Jobbing foundries catering to the electrical manufacturing interests here are faring best.

Ingot operations continue at 38 per cent of capacity.

. .GREAT BRITAIN. .

. . . *Blast furnaces being damped . . . Tin plate prices revised downward.*

LONDON, May 3 (*By Cable*).—Industry demand is poor with pig iron stocks increasing and three Northeast Coast hematite furnaces are being damped. Heavy steel works are well occupied with Government orders, but export business is negligible.

Welsh tin plate makers following the Cartel meeting now have revised prices. The reduction to c.i.f. rates equal to 20s. 3d basis f.o.b. applies to non-empire markets only and on special conditions. Empire and export prices generally are now on c.i.f. rates equal to 21s. 6d. basis. Home trade price is 22s. 3d. basis. Some moderate business was done immediately following the Cartel meeting before the Welsh makers met last Wednesday. Since then demand has again eased. The International Thin Sheet Cartel left export prices on black and galvanized sheets unchanged.

. . . CLEVELAND . . .

. . . Ingot production lower than in first week of April . . . Outlook for immediate future not encouraging . . . Steel scrap 50c lower at Cleveland, $1 off at Youngstown.

CLEVELAND, May 3.—In both the Cleveland-Lorain and Valleys district the month starts out with ingot production slightly lower than at the start of April, and with hand-to-mouth buying still prevalent. The rate for Youngstown and nearby cities is up four points from last week to 29 per cent, compared with 31 per cent in the first week of April, while the Cleveland-Lorain average is down three points from last week to 21 per cent, against 25 per cent in early April.

There is nothing in sight to encourage hopes for gains in the immediate future. Increased caution is manifested by agricultural implement makers and oil companies, while automotive production remains light, and railroad buying is at a standstill. Most of the incoming business in sheets and strip is for replacement of consumers' inventories.

Some automobile parts makers report a postponement of scheduled deliveries from July to September. Meanwhile new die work for 1939 models is going forward at a number of northern Ohio plants, although the probable extent of changes is still in doubt.

Raw material markets continue quiet. Heavy melting scrap prices have declined 50c. at Cleveland and $1 at Youngstown. Only 260,513 tons of ore was moved from upper Lake ports during April.

The Erie Railroad plans to buy not more than 10,000 tons of rails.

Bars, Shapes and Plates

An Akron, Ohio, sewer project will require more than 300 tons of reinforcing bars, with bids closing May 10. The low bid on the 10,000-ton Main Street bridge superstructure and railing, which must be completed by May 30, 1939, was submitted by R. C. Mahon Co., Detroit, at $1,419,370. A. J. Forschner Co., Chicago, was low bidder on the land piers for the bridge, involving 235 tons of bars. Shell Petroleum Corp. plans to build four large tanks for gasoline storage in Toledo as part of its refinery and pipe line expansion program in northwestern Ohio.

Pig Iron

Prospects for gains in May now appear none too encouraging to iron producers. After a fair start, orders and shipments declined during the last part of April and the month wound up with deliveries below the March total. Operating schedules of many foundries are now limited to one or two days a week.

Sheets and Strip

Very little change has been apparent recently from week to week in demand for sheets and strip, orders remaining light due to the comparative inactivity of the automobile industry. Persons who had looked for gains in May now are of the opinion that not much, if any, improvement can be expected.

Iron Ore

Shipments from upper Lake ports during April totaled 260,513 gross tons, according to the Lake Superior Iron Ore Association in its initial report of this kind for the season. The figure represents a decrease of 3,510,042 tons from the 3,770,555 tons shipped from upper Lake ports in April, 1937.

Wire and Wire Products

Wire sellers frankly say that there is very little of an encouraging nature in sight for the immediate future now that the demand for merchant products is declining. The volume of new business during April in fence and nails was below March, although not quite as sharp a reduction as had been expected. Manufacturers wire remains inactive.

Navy to Open Bids in June on Several Boats

WASHINGTON. — The Navy Department will open bids on June 22 for the construction in private yards of four destroyers, three submarines and one tug, and will assign four destroyers and three submarines to Navy Yards. The department meanwhile has ordered the construction of one auxiliary ship each in the Norfolk, Va., and Mare Island, Calif., Navy Yards. Late in the summer private yards will be asked to bid on the construction of two battleships.

It is estimated that the eight destroyers will require 6400 tons of plates, 2800 tons of shapes, the six submarines 3600 tons of plates and 1500 tons of shapes and the tug 500 tons of plates and 250 tons of shapes. The two battleships will call for about 14,000 tons of hull plates and 6000 tons of shapes and bars.

The Commission also reopened bids on Tuesday for 12 more steel cargo vessels which will require about 45,000 tons of steel, of which 36,000 tons will be plates and the remainder shapes and bars. Out of nine companies bidding, the Hess Welded Ship & Barge Corp., of Philadelphia, was the apparent low bidder. Commission officials said it may be several weeks before the contracts are awarded. The bids for the 12 cargo ships were described as "considerably lower" than the February bids which the Commission later rejected as excessive.

April Iron Output Drops 2 Per Cent

PRODUCTION of coke pig iron in April totaled 1,376,141 gross tons, compared with 1,452,487 tons in March. The daily rate last month showed a loss of 2.1 per cent from that in March, or from 46,854 tons to 45,871 tons.

On May 1 there were 79 furnaces making iron, operating at the rate of 42,310 tons daily, compared with 90 furnaces in blast on April 1, producing at the rate of 46,480 tons daily. Eleven furnaces were blown out or banked and none was put in operation. The United States Steel Corp. took off six units, independents took two furnaces off blast, and merchant producers blew out or banked three.

Among the furnaces blown out or banked were the following: two Duquesne, two Edgar Thomson, Carnegie-Illinois Steel Corp.; one Monongahela, National Tube Co.; one Ensley, Tennessee Coal, Iron & Railroad Co.; the Niagara furnace, Tonawanda Iron Corp.; one Haselton, Republic Steel Corp.; Riverside, Wheeling Steel Corp.; one City furnace, Sloss-Sheffield Steel & Iron Co.; and one Woodward Iron Co. furnace.

The tables giving production by months for recent years, which usually are printed with the foregoing text, will appear in next week's issue.

. . . . NEW YORK. . . .

. . . American Can Co. charges that concessions have been made in tin plate prices . . . Prices generally are holding firm . . . Business shows no improvement.

NEW YORK, May 3.—The action of the American Can Co. in sending a letter to its customers in which irregularities in tin plate prices were charged has created a unique situation. In its letter the can company said: "Uncertain and disturbed business conditions have caused a situation in which the official price of tin plate applicable on Jan. 2, 1938, does not now reflect the actual market price of tin plate. Up to the present time the American Can Co. has paid the regular official price for its tin plate, less the regular allowances for cash and multiple packaging on all ordered production sizes of prime plate with seconds arising. Regular allowances for seconds and standard differentials for lighter and heavier gage plate have, of course, applied to our purchases." The letter goes on to say that "under present conditions price adjustments on past deliveries and lower prices for future deliveries should be obtainable and our company is taking steps to achieve this result." Any allowances that are made by tin plate producers, the can company states, will be passed along to its can customers by refunds.

It is understood that the can company is not seeking a downward revision of the official price of tin plate, now $5.35 per base box, Pittsburgh. Tin plate producers do not admit having made concessions to competitors of the American Can Co.; if they were now to make lower prices to American Can in the form of allowances such action would no doubt be tantamount to an admission that such concessions had been made. It is therefore the opinion of some tin plate suppliers that any change in the price would affect the official price, on which contracts for cans are based.

While there have been rumors of price concessions on various steel products, such instances are hard to find and still harder to prove. A user of sheets in this territory who has just bought several carloads was unable to obtain any concession. In the main the price situation has remained unusually firm for times like these, but in previous depression periods the steel industry had neither a rigid wage scale nor a Robinson-Patman Act to consider.

The past week has brought no change of trend in steel buying. Sales have been at a dead level for the past four or five weeks. In some offices sales are slightly up one week and down the next. No improvement is discernible in any particular phase of the market.

Pig Iron

Outside of recent purchases by two local foundries totaling about 550 tons, buying is limited to occasional carlots for immediate delivery. Both of these purchases were at published prices. Backlogs at present are nonexistent in foundries in this district and casting schedules are dependent upon the volume of each day's orders. Compared with a month ago, casting operations are slightly lower. Heater plants and soil pipe foundries have shown a mild seasonal gain, but this has been more than counterbalanced by the sharp reductions that have taken place in other sections of the trade. Export inquiry is without feature, consisting entirely of small tonnages of special analyses.

Plates and Sheets

With but one exception, most plates sellers found the April volume of sales off substantially from March, with the prospects of May business none too bright. There has been a little activity on the part of tank builders, but in general this branch of the industry is operating much below normal. Some of the shipyards have been ordering material for repair work and for barges, and the largest project in sight is still the 30 barges for the Department of Sanitation. Bids for these garbage scows, for which 9000 tons of plates is estimated, are due May 9, but as yet the necessary appropriation has not been made by the Board of Estimate of the City. Refinery equipment makers are rapidly reaching the end of their backlogs of orders.

In general, the April volume of new business was 25 per cent below that of March. Jobbing business remains light and is being seriously affected by seconds, which have flooded this market. Over 60 local jobbers handling galvanized sheets met in New York last week to discuss this problem. Price on seconds is 3.85c. base, delivered New York.

Wire

Manufacturers' wire is still in a slump and is drifting sidewise. Fabricated wire and that handled through the jobbing trade is seasonally more active, although poultry netting and farm fencing is not selling nearly as well as anticipated. The spring season came on faster than expected and sent farmers into planting weeks before they had anticipated, cutting repair jobs short. Prices are firm.

Reinforcing Bars

New business in the past week consisted mainly of lots under 100 tons, with World's Fair work accounting for a substantial portion of the new orders. Pending tonnages, mostly of a public character, were bolstered by a sewer job in the Bronx that will take 1000 tons and by another section of the Ward's Island sewage treatment project that will take 250 tons. Bids on the latter job are being taken by the Department of Public Works, New York, and will close May 17. One seller in this district reports that the volume of small lot sales in the past two weeks was the best in some time, due mainly to the booking of a number of World's Fair jobs. Buying from other sources, however, has shown no improvement from the low levels of the past several months.

CANADA

International Nickel awards 1200 tons of steel . . . Scrap prices lower.

TORONTO, May 3.—Dominion Bridge Co., Montreal, has been awarded a contract for 1200 tons of structural steel by International Nickel Co., Sudbury, Ont. Canadian mills continue to receive orders from Great Britain and it is believed that business of this nature will enable steel companies, especially Dominion Steel, to maintain capacity operations throughout the year.

Scrap prices have dropped $1 a ton.

. . PHILADELPHIA . .

. . . Eastern Pennsylvania operations unchanged at 27 per cent . . . Steel buying is nil . . . Prices wabbly in certain directions . . . Scrap off further as brokers' hopes wane.

PHILADELPHIA, May 3.—The best order any steel seller can get today is a carload, and even carloads are very few and far between. When the miscellaneous buying of very scattered nature ruling the current market is split among six or seven steel companies, it is obvious that no one producer is taking in enough tonnage to keep even a skeleton office force busy. April business has generally averaged under the March level, and no mill can see anything sufficiently encouraging in the near future to justify expectation of acceleration in turnover. Most district producers have built up fair stocks of semi-finished steel, and, while the operating rate this week is unchanged at 27 per cent, it seems that a decline will be in order over the next fortnight.

The past two weeks have been marked by considerable talk on the subject of prices, as for instance quotations on fabricated bars and shapes, and on plates and sheets. More than one mill intimates that some odd pricing has been uncovered, but all insist that the general situation is steadied by the knowledge that major companies will meet legitimate competition in any direction and for any amounts.

Railroads show no promise of buying for many months; auto body stamping plants continue on greatly reduced schedules, and probably will remain so until '39 models come out; stove builders report little seasonal lift; one district radio producer, Philco, is involved in labor difficulties; building construction is lower than it has been since 1931-32; and miscellaneous turnover, while well diversified, aggregates no significant tonnage at the moment. In opposition to these negative factors, is the slightly better tone in the tin plate market, even though the price situation is uncertain; also the possibility that a number of the 16 boats being bid at Washington May 3 and 17 will come into this area.

Scrap, reflecting the absence of domestic demand and a decline in export shipments, continues very much on the weak side, with principal grades off another 50c. this week.

The 3725 tons involved in the Mt. Gretna prison and the White Hill, Pa., school will be delayed while the projects are re-designed and re-advertised. Otherwise, fabricators' lists are as slack as they were in 1931-32, and most of them are so hungry for work that prices have reacted accordingly during the past month. Bids are in for nine State highway jobs, averaging 45 tons apiece, and tenders are due May 13 on five more projects which average about 60 tons each.

Imports

The following iron and steel imports were received here during the past week: 6000 tons of chrome ore from Turkey; 115 tons of steel sheets, 15 tons of steel bars and 153 tons of structural shapes from Belgium; 5 tons of steel bars and 63 tons of structural shapes from France.

. . .BOSTON. . .

. . . Foundry business dull . . . Pig iron sales correspondingly small.

BOSTON, May 3. — April was a disappointing month to furnace representatives. Sales the last week were almost nil, making sales for the month among the smallest on record. The outlook for improved business is rather cloudy at the moment. Just how the depression has hit the foundry industry can be illustrated by the doings of one of the largest. In good times this particular foundry bought 10,000 tons or more of pig iron per year. Late in 1937 it purchased not more than 2500 tons. Today it has between 800 and 1000 tons piled in its yard. It is operating 21 hours and melting 10 tons of iron per week. Its pattern shop has nothing to do, an indication of a lack of new business.

The Central Vermont Railway has put its St. Albans, Vt., motive power and car shops on full time. Heretofore it operated them on part time and with skeleton crews. New Haven Railroad shops are quite busy reconditioning passenger cars, and the situation so far as Boston & Maine Railroad shops are concerned is fairly encouraging. The Massachusetts subsidiary of the Pullman Co. has been doing quite well.

RAILROAD BUYING

Southern Railway has ordered 5550 freight cars (an increase of 550 over the original inquiry put out recently), distributed as follows: 2000 box cars to Pullman-Standard Car Mfg. Co., Birmingham; 1000 box, 200 furniture and 50 65-ft. gondola cars to Mount Vernon Car Mfg Co., Mount Vernon, Ill.; 1250 high-side gondola cars to American Car & Foundry Co., St. Charles, Mo.; 700 low side gondola cars to Pressed Steel Car Co., McKees Rocks, Pa.; 250 stock cars to Ralston Steel Car Co., Columbus, Ohio, and 100 flat cars to Greenville Steel Car Co., Greenville, Pa. This railroad is also considering the purchase of four diesel-electric passenger units.

Akron, Canton & Youngstown is considering the purchase of three locomotives.

RAILS AND TRACK SUPPLIES

Erie is asking bids on about 10,000 tons of rails.

Illinois Central has placed 2130 tons of rails with Tennessee Coal, Iron & Railroad Co.

Apollo Independent Union Agreement Reopens Plant

APOLLO, Pa.—Repudiation of the Steel Workers' Organizing Committee and the formation of an independent employees union by at least 75 per cent of the wage earners of the plant, coupled with a one-year agreement between this union and the management, resulted in reopening of the Apollo Steel Co.'s plant in Apollo, Pa., closed since April 1 when the company asked workmen to take a pay cut.

Practically 950 employees, comprising the entire wage earning working force, have returned to work this week. Details of the agreement were not divulged by either management or the independent union except that they were "mutually satisfactory." In its ultimatum before closing the plant, Apollo Steel had demanded a 5c. an hour reduction in the higher brackets, ranging down to no reduction for common labor.

U. S. Steel Files Proposal with SEC

THE United States Steel Corp. contemplates filing with the SEC in the near future a registration statement, covering a proposed issue of approximately $100,000,000 of ten-year debentures.

IRON AND STEEL SCRAP

. . . Practically no new sales of scrap reported . . . Composite declines 17c. to $11.75 a ton.

MAY 3. — Scrap transactions throughout the country have reached almost a standstill and hence most prices are nominal, but on the soft side. In the absence of sales, prices are unchanged at Chicago, and at Pittsburgh No. 1 steel is no weaker, but lack of strength in the market there is indicated by declines of 50c. to $1 in other items. With no support from the export market, prices at Philadelphia are off 50c. on the principal grades. As a result, THE IRON AGE composite is down 17c. from last week, to $11.75, new low for the year. Quotations at both Cleveland and Youngstown show pronounced weakness, and bundles and turnings are lower in Detroit. Bundles and No. 1 steel resisted general declines in the Cincinnati area, whereas St. Louis prices are unchanged.

Pittsburgh

The market for No. 1 steel is no weaker than a week ago, but it can hardly be said that it has shown any strength. In some cases No. 1 steel is not plentiful, but because of the small tonnages involved in recent orders into consumption, brokers are having no difficulty covering at $11.50 a ton. No. 2 heavy melting is unchanged this week at $11.50 to $12. Railroad heavy melting steel on the recent list was sold in this district at slightly under $14 a ton.

Chicago

Since local mills are still absent from the market, prices are unchanged and nominal. The Chicago & North Western sold about 500 tons of heavy melting steel at a price in line with current quotations, whereas last month both the Burlington and Rock Island lists were not sold because of low bids.

Cleveland

Quotations are down both at Youngstown and Cleveland, the result of pronounced weaknesses in other districts, the failure of mill operations to improve and the generally bleak outlook for the immediate future. No. 1 heavy melting steel at Cleveland is off 50c. to $10.50 to $11 and at Youngstown off $1 to $11 to $11.50, based on a trifling sale into mill consumption. The slump is reflected through practically the entire list. While the present nominal quotations represent levels at which small tonnages might be obtained, a prospective buyer of 5000 tons or more could hardly hope to obtain the material at anywhere near the present prices.

St. Louis

The scrap iron market remains quiet and unchanged. Consumers in the district show no indication of further early buying. Dealers are accumulating material to fill recent orders by picking up a car here and there as holders find it necessary to sell. Shipments from the country are light as these dealers prefer to hold for higher prices.

Cincinnati

No. 1 steel and bundles resisted price changes the past week, due to small purchases by nearby mills. Supply of material is reported adequate, but lack of price attraction in the present market keeps dealers' piles relatively intact.

New York

Exports of 334,742 tons of scrap in March as compared with 255,627 in February and 355,979 in March, 1937, give a somewhat misleading picture of the present situation. April shipments will not show much less, but what has made the market so dull in recent months is the fact that so far as local buying is concerned, this material was covered long ago, and new business has yet to come in sight. The trend in buying prices is downward, and this week the exporters are offering 50c. less on most grades.

Buffalo

With a weak tone enveloping the market, every item on the list has been marked down 50c. a ton. Prices receded as the principal consumer of the district found dealers willing to sell at lower bids. No. 1 heavy melting steel is now quoted at $11 to $11.50 a ton.

Boston

Domestic business is practically nothing. Even foundries have ceased buying machinery and textile cast except in truckload lots and then only occasionally. The largest foundries have not bought a thing for five weeks. Locally, the export market is sluggish and prices nominal. There is some life at Providence, however. A boat has taken 1900 tons there and sailed for Newport News to complete loading. Another has arrived from Savannah to load scrap for Italy.

Philadelphia

It is reported that No. 1 steel has been sold to a nearby mill at $12, and the quotation on this grade is marked down accordingly. Also, No. 2 steel, hydraulic bundles, cast grades and turnings have been marked off, either in sympathy with No. 1 steel or on the strength of recent small sales. Turnover is almost nil, with most brokers showing little confidence in the near future. Another export boat is expected within the fortnight, but after that there is little export in prospect for many months. Northern Metal Co. recently secured the seven Reading ferry boats, but they definitely will be resold rather than scrapped. This same company has just purchased a 10,000-ton drydock from United Shipyards, Brooklyn, for scrapping.

N.A.M. Asks Aid for Private Enterprise

NEW YORK.—"Pump-priming to stimulate business cannot succeed unless it is accompanied by governmental policies that will permit business to accept the priming and go forward," the board of directors of the National Association of Manufacturers said after a meeting here attended by 47 representatives of various industries.

"Pouring public funds into pump-priming projects, no matter how freely, cannot provide permanent jobs and economic stability if private enterprise is not encouraged simultaneously to proceed and expand," the board said. "On the other hand, if all possible encouragement is given to private enterprise, then little, if any, pump-priming will be necessary."

Foundry Equipment Show Opens May 14

AS a prelude to the technical sessions of the annual convention of the American Foundrymen's Association which will be held in Cleveland, May 16 to 19, foundrymen of Northeastern Ohio will open the foundry supplies and equipment show on Saturday, May 14. Tickets are being distributed to all foundry employees throughout the district and it is anticipated that up to 10,000 persons will see the equipment on display that day.

Charles R. Hook, president and general manager of the American Rolling Mill Co., Middletown, Ohio, and president of the National Association of Manufacturers, is scheduled to address the annual business meeting of the foundrymen's association on May 18, and H. V. Kaltenborn, radio commentator, will speak at the annual dinner to be held in Hotel Cleveland on the evening of that day.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:		
No. 1 hvy. mltng. steel.	$11.50 to	$12.00
Railroad hvy. mltng...	13.50 to	14.00
No. 2 hvy. mltng. steel.	10.50 to	11.00
Scrap rails	15.00 to	15.50
Rails 3 ft. and under..	17.50 to	18.00
Comp. steel	11.50 to	12.00
Hand bundled sheets..	10.50 to	11.00
Hvy. steel axle turn..	10.00 to	10.50
Machine shop turn....	6.50 to	7.00
Short shov. turn.....	6.50 to	7.00
Mixed bor. & turn.....	6.00 to	6.50
Cast iron borings	6.00 to	6.50
Cast iron carwheels....	13.50 to	14.00
Hvy. breakable cast...	11.50 to	12.00
No. 1 cupola cast.....	14.00 to	14.50
RR. knuckles & clprs..	15.50 to	16.00
Rail coil & leaf springs	16.00 to	16.50
Rolled steel wheels....	16.00 to	16.50
Low phos. billet crops.	16.50 to	17.00
Low phos. punchings..	15.00 to	15.50
Low phos. plate, hvy.	15.50 to	16.00
Low phos. plate clips..	13.50 to	14.00

PHILADELPHIA

Per gross ton delivered to consumer:		
No. 1 hvy. mltng. steel.	$12.00 to	$12.50
No. 2 hvy. mltng. steel.	10.00 to	10.50
Hydraulic bund., new.	12.00 to	12.50
Hydraulic bund., old..	8.50 to	9.00
Steel rails for rolling..	16.00 to	16.50
Cast iron carwheels...	14.50 to	15.00
Hvy. breakable cast...	....	13.50
No. 1 cast.....	15.00 to	15.50
Stove plate (steel wks.)	10.50 to	11.00
Railroad malleable	15.00 to	15.50
Machine shop turn....	....	7.00
No. 1 blast furnace....	6.00 to	6.50
Cast borings	6.00 to	6.50
Heavy axle turnings...	8.50 to	9.00
No. 1 low phos. hvy....	16.50 to	17.00
Couplers & knuckles..	16.00 to	16.50
Rolled steel wheels....	16.00 to	16.50
Steel axles	20.00 to	20.50
Shafting	19.00 to	19.50
No. 1 RR. wrought....	15.00 to	15.50
Spec. iron & steel pipe	12.00 to	12.50
No. 1 forge fire.....	11.00 to	11.50
Cast borings (chem.)..	10.50 to	11.00

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton	
Hvy. mltng. steel.....	$11.00 to	$11.50
Auto. hvy. mltng. steel alloy free	9.50 to	10.00
No. 2 auto. steel	9.00 to	9.50
Shoveling steel	11.00 to	11.50
Hydraul. comp. sheets	10.00 to	10.50
Drop forge flashings...	8.75 to	9.25
No. 1 busheling	9.75 to	10.25
No. 2 busheling, old...	4.25 to	4.75
Rolled carwheels	13.50 to	14.00
Railroad tires, cut....	15.00 to	15.50
Railroad leaf springs..	14.50 to	15.00
Steel coup. & knuckles	13.50 to	14.00
Axle turnings	10.50 to	11.00
Coil springs	15.50 to	16.00
Axle turn. (elec.).....	10.50 to	11.00
Low phos. punchings..	14.50 to	15.00
Low phos. plates, 12 in. and under	13.50 to	14.00
Cast iron borings	4.00 to	4.50
Short shov. turn.....	5.50 to	6.00
Machine shop turn....	4.00 to	4.50
Rerolling rails	14.25 to	14.75
Steel rails under 3 ft...	14.50 to	15.00
Steel rails under 2 ft...	15.00 to	15.50
Angle bars, steel.....	13.00 to	13.50
Cast iron carwheels...	12.75 to	13.25
Railroad malleable ...	12.25 to	12.75
Agric. malleable	11.00 to	11.50
	Per Net Ton	
Iron car axles	$17.00 to	$17.50
Steel car axles	15.50 to	16.00
No. 1 RR. wrought....	8.50 to	9.00
No. 2 RR. wrought....	9.75 to	10.25
Locomotive tires	14.75 to	15.25
Pipes and flues	8.25 to	8.75
No. 1 machinery cast..	10.50 to	11.00
Clean auto. cast.....	10.25 to	10.75
No. 1 railroad cast....	9.75 to	10.25
No. 1 agric. cast.....	9.50 to	10.00
Stove plate	7.50 to	8.00
Grate bars	7.50 to	8.00
Brake shoes	7.00 to	7.50

YOUNGSTOWN

Per gross ton delivered to consumer:		
No. 1 hvy. mltng. steel.	$11.00 to	$11.50
Hydraulic bundles	10.50 to	11.00
Machine shop turn....	7.00 to	7.50

CLEVELAND

Per gross ton delivered to consumer:		
No. 1 hvy. mltng. steel.	$10.50 to	$11.00
No. 2 hvy. mltng. steel.	9.50 to	10.00
Comp. sheet steel	10.00 to	10.50
Light bund. stampings.	7.50 to	8.00
Drop forge flashings...	9.50 to	10.00
Machine shop turn....	5.00 to	5.50
Short shov. turn.....	5.50 to	6.00
No. 1 busheling	9.50 to	10.00
Steel axle turnings	8.50 to	9.00
Low phos. billet and bloom crops	17.00 to	17.50
Cast iron borings	5.50 to	6.00
Mixed bor. & turn.....	5.50 to	6.00
No. 2 busheling	5.50 to	6.00
No. 1 cast.....	15.00 to	15.50
Railroad grate bars ..	6.50 to	7.00
Stove plate	6.00 to	6.50
Rails under 3 ft.	16.00 to	16.50
Rails for rolling	14.00 to	14.50
Railroad malleable	14.50 to	15.00
Cast iron carwheels...	13.50 to	14.00

BUFFALO

No. 1 hvy. mltng. steel.	$11.00 to	$11.50
No. 2 hvy mltng. steel...	9.00 to	9.50
Scrap rails	13.00 to	13.50
New hvy. b'ndled sheets	9.50 to	10.00
Old hydraul. bundles..	8.00 to	8.50
Drop forge flashings ..	9.00 to	9.50
No. 1 busheling	9.00 to	9.50
Hvy. axle turnings....	9.00 to	9.50
Machine shop turn....	4.50 to	5.00
Knuckles & Couplers..	14.50 to	15.00
Coil & leaf springs....	14.50 to	15.00
Rolled steel wheels....	14.50 to	15.00
Low phos. billet crops.	15.50 to	16.00
Shov. turnings	6.50 to	7.00
Mixed bor. & turn.....	5.00 to	5.50
Cast iron borings	5.00 to	5.50
Steel car axles	14.50 to	15.00
No. 1 machinery cast..	13.50 to	14.00
No. 1 cupola cast.....	12.50 to	13.00
Stove plate	11.00 to	11.50
Steel rails under 3 ft...	16.00 to	16.50
Cast iron carwheels....	12.50 to	13.00
Railroad malleable ...	12.00 to	12.50
Chemical borings	8.00 to	8.50

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:		
Selected hvy. melting.	$10.50 to	$11.00
No. 1 hvy. melting....	10.50 to	11.00
No. 2 hvy. melting....	9.75 to	10.00
No. 1 locomotive tires.	11.50 to	12.00
Misc. stand. sec. rails.	11.50 to	12.00
Railroad springs	13.50 to	14.00
Bundled sheets	5.50 to	6.00
No. 1 busheling	7.00 to	7.50
Cast bor. & turn.....	3.00 to	3.50
Rails for rolling	13.00 to	13.50
Machine shop turn....	3.00 to	3.50
Heavy turnings	8.00 to	8.50
Steel car axles	17.00 to	17.50
Iron car axles	19.50 to	20.00
No. 1 RR. wrought....	7.50 to	8.00
No. 2 RR. wrought....	10.00 to	10.50
Steel rails under 3 ft...	13.00 to	13.50
Steel angle bars	12.00 to	12.50
Cast iron carwheels...	11.50 to	12.00
No. 1 machinery cast..	12.00 to	12.50
Railroad malleable	11.00 to	11.50
No. 1 railroad cast....	10.50 to	11.00
Stove plate	6.50 to	7.00
Agricul. malleable	10.00 to	10.50
Grate bars	6.50 to	7.00
Brake shoes	6.50 to	7.00

CINCINNATI

Dealers' buying prices per gross ton at yards:		
No. 1 hvy. mltng. steel.	$8.00 to	$8.50
No. 2 hvy. mltng. steel.	6.00 to	6.50
Scrap rails for mltng.	12.75 to	13.25
Loose sheet clippings.	3.50 to	4.00
Hydrau. b'ndled sheets	7.50 to	8.00
Cast iron borings	2.00 to	2.50
Machine shop turn....	2.50 to	3.00
No. 1 busheling	6.25 to	6.75
No. 2 busheling	1.50 to	2.00
Rails for rolling	14.75 to	15.25
No. 1 locomotive tires.	11.50 to	12.00
Short rails	15.25 to	15.75
Cast iron carwheels...	10.00 to	10.50
No. 1 machinery cast.	10.00 to	10.50
No. 1 railroad cast....	8.50 to	9.00
Burnt cast	5.00 to	5.50
Stove plate	5.00 to	5.50
Agricul. malleable	9.25 to	9.75
Railroad malleable	11.25 to	11.75
Mixed hvy. cast	6.75 to	7.25

BIRMINGHAM

Per gross ton delivered to consumer:		
Hvy. melting steel	$11.50 to	$12.00
Scrap steel rails	14.00 to	14.50
Short shov. turnings..	7.50 to	8.10
Stove plate	9.00 to	10.00
Steel axles	15.00 to	16.00
Iron axles	15.00 to	16.00
No. 1 RR. wrought....	....	10.00
Rails for rolling	15.00 to	16.00
No. 1 cast	14.00 to	16.50
Tramcar wheels	14.00 to	15.00

DETROIT

Dealers' buying prices per gross ton:		
No. 1 hvy. mltng. steel.	$7.00 to	$7.50
No. 2 hvy. mltng. steel.	6.00 to	6.50
Borings and turnings.	3.50 to	4.00
Long turnings	3.00 to	3.50
Short shov. turnings..	4.00 to	4.50
No. 1 machinery cast..	11.75 to	12.25
Automotive cast	12.75 to	13.25
Hvy. breakable cast...	10.00 to	10.50
Hydraul. comp. sheets.	7.50 to	8.00
Stove plate	6.75 to	7.25
New factory bushel...	6.50 to	7.00
Old No. 2 busheling...	2.50 to	3.00
Sheet clippings	4.50 to	5.00
Flashings	6.00 to	6.50
Low phos. plate scrap.	7.75 to	8.25

NEW YORK

Dealers' buying prices per gross ton on cars:		
No. 1 hvy. mltng. steel.	$8.00 to	$8.50
No. 2 hvy. mltng. steel.	6.50 to	7.00
Hvy. breakable cast...	9.00 to	9.50
No. 1 machinery cast.	11.50 to	12.00
No. 2 cast	7.50 to	8.00
Stove plate	6.50 to	7.00
Steel car axles	20.00 to	20.50
Shafting	15.00 to	15.50
No. 1 RR. wrought....	11.00 to	11.50
No. 1 wrought long....	9.50 to	10.00
Spec. iron & steel pipe	8.50 to	9.00
Rails for rolling	16.00 to	16.50
Clean steel turnings*..	3.00 to	3.50
Cast borings*	3.00 to	3.50
No. 1 blast furnace...	3.00 to	3.50
Cast borings (chem.)..	9.50 to	10.00
Unprepared yard scrap	6.00 to	6.50
Light iron	3.50 to	4.00
Per gross ton, delivered local foundries:		
No. 1 machn. cast.....	$14.00 to	$15.00
No. 2 cast	11.50 to	12.00

*$1.50 less for truck loads.

BOSTON

Dealers' buying prices per gross ton:		
No. 1 hvy. mltng. steel.	$13.30 to	$13.80
Scrap rails	13.30 to	13.80
No. 2 steel	12.30 to	12.80
Breakable cast	....	9.75
Machine shop turn.....	....	1.45
Mixed bor. & turn.....	....	1.45
Bun. skeleton long ...	4.25 to	4.35
Shafting	17.00 to	17.50
Cast bor. chemical.....	6.00 to	6.50
Per gross ton delivered consumers' yards:		
Textile cast	15.00 to	15.50
No. 1 machine cast....	15.00 to	15.50

PACIFIC COAST

Per gross ton delivered to consumer:		
No. 1 hvy. mltng. steel.	$11.65 to	$12.15
No. 2 hvy. mltng. steel.	10.65 to	11.15

CANADA

Dealers' buying prices at their yards, per gross ton:

	Toronto	Montreal
No. 1 hvy. mltng. steel.	$10.50	$9.50
No. 2 hvy. mltng. steel.	9.50	8.50
Mixed dealers steel....	8.50	7.50
Scrap pipe	8.50	7.50
Steel turnings	7.50	7.00
Cast borings	8.50	7.50
Machinery cast	15.00	14.00
Dealers cast	13.00	12.00
Stove plate	11.00	10.50

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges		
No. 1 hvy. mltng. steel.	$10.50 to	$11.00
No. 2 hvy. mltng. steel.	$9.00 to	9.50
No. 2 cast		9.00
Stove plate	7.50 to	8.00
Boston on cars at Army Base or Mystic Wharf		
No. 1 hvy. mltng. steel.....		$11.50
No. 2 hvy. mltng. steel		10.50
Rails (scrap)		11.50
Philadelphia, delivered alongside boats, Port Richmond		
No. 1 hvy. mltng. steel.	$12.00 to	12.50
No. 2 hvy. mltng. steel.	10.00 to	10.50

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham. Prices at Duluth are $2 a ton higher, and delivered Detroit $3 higher.

	Per Gross Ton
Rerolling	$37.00
Forging quality	43.00

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or Bessemer	$37.00

Skelp

Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	2.10c.

Wire Rods
(No. 5 to 9/32 in.)

	Per Gross Ton
Pittsburgh or Cleveland	$47.00
Chicago, Youngstown or Anderson, Ind.	48.00
Worcester, Mass.	49.30
Birmingham	50.90
San Francisco	56.00
Galveston	53.00

Rods over 9/32 in. or 47/64 in., inclusive, $5 a ton over base.

SOFT STEEL BARS

	Base per Lb.
Pittsburgh	2.45c.
Chicago or Gary	2.50c.
Duluth	2.60c.
Detroit	2.60c.
Cleveland	2.50c.
Buffalo	2.55c.
Philadelphia	2.77c.
New York	2.81c.
Birmingham	2.60c.
On cars dock Gulf ports	2.85c.
On cars dock Pacific ports	3.00c.

RAIL STEEL BARS
(For merchant trade)

Pittsburgh	2.30c.
Cleveland, Chicago, Gary or Moline, Ill.	2.35c.
Buffalo	2.40c.
Birmingham	2.45c.
On cars dock Gulf ports	2.70c.
On cars dock Pacific ports	2.85c.

BILLET STEEL REINFORCING BARS
(Straight lengths as quoted by distributers)

Pittsburgh	2.45c.
Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham	2.50c.
Detroit	2.60c.
On cars dock Gulf ports	2.85c.
On cars dock Pacific ports	2.95c.

RAIL STEEL REINFORCING BARS
(Straight lengths as quoted by distributers)

Pittsburgh	2.30c.
Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham	2.35c.
On cars dock Gulf ports	2.70c.
On cars dock Pacific ports	2.80c.

IRON BARS

Chicago	2.40c.
Pittsburgh (refined)	3.60c.

COLD FINISHED BARS AND SHAFTING*

	Base Per Lb.
Pittsburgh	2.90c.
Cleveland, Chicago and Gary	2.95c.
Buffalo	3.00c.
Detroit	2.95c.

* In quantities of 10,000 to 19,999 lb.

PLATES

	Base Per Lb.
Pittsburgh	2.25c.
Chicago or Gary	2.30c.
Cleveland	2.45c.
Coatesville or Spar. Pt.	2.35c.
Philadelphia	2.445c.
New York	2.55c.
Birmingham	2.40c.
On cars dock Gulf ports	2.65c.
On cars dock Pacific ports	2.80c.
Wrought iron plates, P't'g	3.80c.

FLOOR PLATES

Pittsburgh	3.50c.
Chicago	3.55c.
Coatesville	3.60c.
On cars dock Gulf ports	3.90c.
On cars dock Pacific ports	4.05c.

STRUCTURAL SHAPES

	Base per Lb.
Pittsburgh	2.25c.
Chicago	2.30c.
Cleveland	2.45c.
Buffalo or Bethlehem	2.35c.
Philadelphia	2.465c.
New York	2.52c.
Birmingham (standard)	2.40c.
On cars dock Gulf ports	2.65c.
On cars dock Pacific ports	2.80c.

STEEL SHEET PILING

	Base per Lb.
Pittsburgh	2.60c.
Chicago or Buffalo	2.70c.
On cars dock Gulf or Pacific Coast ports	.05c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$42.50
Angle bars, per 100 lb	2.80

F.o.b. Basing Points

Light rails (from billets) per gross ton	$43.00
Light rails (from rail steel) per gross ton	42.00

	Base per Lb.
Spikes	3.15c.
Tie plates, steel	2.30c.
Tie plates, Pacific Coast ports	2.40c.
Track bolts, to steam railroads	4.35c.
Track bolts, to jobbers, all sizes (per 100 counts)	65-5 per cent off list

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS

Hot Rolled, 10 Gage

	Base per Lb.
Pittsburgh	2.10c.
Gary	2.50c.
Detroit	2.60c.
Philadelphia	2.72c.
Granite City	2.60c.
Birmingham	2.55c.
On cars dock Pacific ports	2.95c.
Wrought iron, Pittsburgh	4.25c.

Hot Rolled Annealed, 24 Gage

Pittsburgh	3.15c.
Gary	3.25c.
Detroit	3.35c.
Philadelphia	3.47c.
Granite City	3.35c.
Birmingham	3.30c.
On cars dock Pacific ports	3.80c.
Wrought iron, Pittsburgh	5.15c.

Heavy Cold Rolled, 10 Gage*

Pittsburgh	3.00c.
Gary	3.10c.
Detroit	3.20c.
Philadelphia	3.32c.
Granite City	3.20c.
Birmingham	3.15c.
On cars dock Pacific ports	3.60c.

Light Cold Rolled, 20 Gage*

Pittsburgh	3.45c.
Gary	3.55c.
Detroit	3.65c.
Philadelphia	3.77c.
Granite City	3.65c.
Birmingham	3.60c.
On cars dock Pacific ports	4.00c.

* Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base.

Galvanized Sheets, 24 Gage

Pittsburgh	3.80c.
Gary	3.90c.
Philadelphia	4.12c.
Granite City	4.00c.
Birmingham	3.95c.
On cars dock Pacific ports	4.40c.
Wrought iron, Pittsburgh	6.10c.

Electrical Sheets
(*F.o.b. Pittsburgh*)

	Base per Lb.
Field grade	3.35c.
Armature	3.70c.
Electrical	4.20c.
Special Motor	5.10c.
Special Dynamo	5.80c.
Transformer	6.30c.
Transformer Special	7.30c.
Transformer Extra Special	7.80c.

Base gage changed from 28 to 24 gage. Gage extras are the same as those applying on hot-rolled, annealed sheets with few exceptions. *Silicon Strip in coils—Sheet price plus silicon sheet extra width extras plus 25c. per 100 lb. for coils.*

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	4.10c.
F.o.b. Gary	4.20c.
F.o.b. cars dock Pacific ports	4.80c.

Vitreous Enameling Stock, 20 Gage

Pittsburgh	3.50c.
Gary	3.60c.
Granite City	3.70c.
On cars dock Pacific ports	4.10c.

TIN MILL PRODUCTS

Black Plate, 28 Gage

Pittsburgh	3.30c.
Gary	3.40c.
Granite City	3.50c.
On cars dock Pacific ports, boxed	4.175c.

Tin Plate

	Base per Box
Standard cokes, Pittsburgh	$5.35
Standard cokes, Gary	5.45
Standard cokes, Granite City	5.55

Special Coated Manufacturing Ternes

	Base per Box
Pittsburgh	$4.65
Gary	4.75
Granite City	4.85

Roofing Terne Plate
(*F.o.b. Pittsburgh*)
(Per Package, 112 sheets, 20 x 28 in.)

8-lb. coating I.C.	$12.00
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.00
25-lb. coating I.C.	16.00
30-lb. coating I.C.	17.25
40-lb. coating I.C.	19.50

HOT ROLLED STRIP
(*Widths up to 24 in.*)

	Base per Lb.
Pittsburgh	2.40c.
Chicago	2.50c.
Detroit	2.60c.
Granite City	2.60c.
Birmingham	2.55c.

Cooperage Stock

Pittsburgh	2.50c.
Chicago	2.60c.

COLD ROLLED STRIP*

	Base per Lb.
Pittsburgh	3.20c.
Cleveland	3.20c.
Chicago	3.49c.
Worcester	3.10c.

* Carbon 0.25 and less.

Commodity Cold Rolled Strip

No. 14, Pittsb'gh or Cleveland	3.35c.
No. 14, Worcester	3.75c.
No. 20, Pittsb'gh or Cleveland	3.75c.
No. 20, Worcester	4.15c.

COLD ROLLED SPRING STEEL

		Pittsburgh and Cleveland	Worcester
Carbon	0.25-0.50%	3.20c.	3.40c.
Carbon	.51- .75	4.45c.	4.65c.
Carbon	.76-1.00	6.30c.	6.50c.
Carbon Over	1.00	8.50c.	8.70c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland)

To Manufacturing Trade

	Per Lb.
Bright wire	2.90c.
Galvanized wire	2.95c.
Spring wire	3.50c.

Chicago prices on products sold to the manufacturing trade are $1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are $3 a ton above, Birmingham $3 above, and Pacific Coast prices $9 a ton above Pittsburgh or Cleveland.

To the Trade

	Base per Keg
Standard wire nails	$2.75
Smooth coated nails	2.75
Cut nails, carloads	3.60

	Base per 100 Lb.
Annealed fence wire	$3.15
Galvanized fence wire	3.55
Polished staples	3.45
Galvanized staples	3.70
Barbed wire, galvanized	3.40
Twisted barbless wire	3.40
Woven wire fence, base column.	74
Single loop bale ties, base col...	63

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., mill prices are $2 a ton over Pittsburgh, except for woven wire fence, which is $3 over Pittsburgh and Birmingham mill prices are $3 a ton over Pittsburgh.

On wire nails, barbed wire and staples, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are $6 a ton over Pittsburgh.

On nails, staples and barbed wire, prices of $6 a ton over Pittsburgh are also quoted at Beaumont and Orange, Tex.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel			Wrought Iron		
In.	Black	Galv.	In.	Black	Galv.
⅛	52	31	¼ & ⅜	+13	+35
¼ to ⅜	..55	38½	½	20	1½
½	....59½	49	¾	26	8
¾	....62½	53	1 & 1¼	..30	14
1 to 3	..64½	55½	1½	34	16½
			2	....33½	16

Lap Weld

2	57	47½	2	....26½	10
2½ & 3	..60	50½	2½ to 3½	27½	12½
3½ to 6	..62	52½	4	....29½	16
7 & 8	..61	50½	4½ to 8.	28½	15
9 & 10	..60½	50	9 to 12.	.24½	10
11 & 12	..59½	49			

Butt Weld, extra strong, plain ends

⅛	....50½	36½	¼ & ⅜	+14	+48
¼ to ⅜	..52½	40½	½	21	4
½	....57½	48½	¾	27	10
¾	....61½	52½	1 to 2.	.34	17½
1 to 3	63	55			

Lap Weld, extra strong, plain ends

2	55	46½	2	....29½	13½
2½ & 3.59		50½	2½ to 4.	.35	20½
3½ to 6.62		54	4½ to 6.	.33½	19
7 & 8	..61½	54	7 & 8	..34½	19½
9 & 10	..60½	50	9 to 12.	.28	15½
11 & 12	..59½	49			

On butt-weld and lap-weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

		Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G.	$ 9.46	$ 8.41
1¼ in. o.d.	13 B.W.G.	11.21	9.96
1½ in. .od.	13 B.W.G.	12.38	11.00
1¾ in. o.d.	13 B.W.G.	14.09	12.51
2 in. o.d.	13 B.W.G.	15.78	14.02
2¼ in. o.d.	13 B.W.G.	17.60	15.63
2¼ in. o.d.	12 B.W.G.	19.37	17.21
2½ in. o.d.	12 B.W.G.	21.22	18.85
2¾ in. o.d.	12 B.W.G.	22.49	19.98
2 in. o.d.	12 B.W.G.	23.60	20.97
4½ in. o.d.	10 B.W.G.	45.19	40.15
3½ in. o.d.	11 B.W.G.	29.79	26.47
4 in. o.d.	10 B.W.G.	36.96	32.83
5 in. o.d.	9 B.W.G.	56.71	50.38
6 in. o.d.	7 B.W.G.	87.07	77.35

Extra for less-carload quantities:

40,000 lb. or ft. or over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

CAST IRON WATER PIPE

Per Net Ton

*6-in. and larger, del'd Chicago.	$55.00
6-in. and larger, del'd New York	53.00
*6-in. and larger, Birmingham.	47.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles....	56.00
F.o.b. dock, Seattle....	56.00
4-in. f.o.b. dock, San Francisco or Los Angeles	59.00
F.o.b. dock, Seattle	56.00

Class "A" and gas pipe, $3 extra 4-in. pipe is $3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $46, Birmingham, and $54 delivered Chicago and 4-in. pipe, $49, Birmingham, and $58 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts:	
½ in. & 6 in. and smaller.	65 and 5*
Larger and longer up to 1 in.	60 and 10*
1⅛ in. and larger	60 and 5*
Lag bolts	60 and 10
Plow bolts, Nos. 1, 2, 3 and 7	65 and 5
Hot pressed nuts, and c.p.c. and t nuts, square or hex. blank or tapped:	
½ in. and smaller	65
9/16 in. to 1 in. inclusive.	60 and 5
1⅛ in. and larger	60

* Less carload lots and less than full container quantity. Less carloads lots in full container quantity, an additional 10 per cent discount; carload lots and full container quantity, still another 5 per cent discount.

Semi-finished hexagon units, U.S.S. and S.A.E.:	
½ in. and smaller	60 and 10
9/16 in. to 1 in. inclusive.	60 and 5
⅛ in. and larger	60
Stove bolts in packages, nuts attached	70
Stove bolts in packages, with nuts separate	70 and 10
Stove bolts in bulk	80

On stove bolts freight is allowed to destination on 200 lb. and over.

Large Rivets

(½-in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh or Cleveland.	$3.60
F.o.b. Chicago or Birmingham.	3.70

Small Rivets

(7/16-in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh	65 and 5
F.o.b. Cleveland	65 and 5
F.o.b. Chicago and Birmingham	65 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

Per Cent Off List

Milled cap screws, 1 in. dia. and smaller	50 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75
Milled headless set screws, cut thread ¾ in. and smaller	75
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	70 and 5
Upset set screws, cup and oval points	80 and 5
Milled studs	65

Alloy and Stainless Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem. Base price, $60 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton. Open-hearth grade, base..... 3.00c. Delivered, Detroit ..... 3.15c.

S.A.E. Series Numbers	Alloy Differential per 100 Lb.
200 (½% Nickel)	$0.35
2100 (1½% Nickel)	0.75
2300 (3½ Nickel)	1.55
2500 (5% nickel)	$2.25
3100 Nickel-chromium	0.70
3200 Nickel-chromium	1.35
3300 Nickel-chromium	3.80
3400 Nickel-chromium	3.20
4100 Chromium-molybdenum (0.15 to 0.25 Molybdenum).	0.55
4100 Chromium-molybdenum (0.25 to 0.40 Molybdenum).	0.75
4600 Nickel-molybdenum (0.20 to 0.30 Mo. 1.50 to 2.00 Ni)	1.10
5100 Chrome steel (0.60-0.90 Cr.)	0.35
5100 Chrome steel (0.80-1.10 Cr.)	0.45
5100 Chromium spring steel	0.15
6100 Chromium-vanadium bar.	1.20
6100 Chromium-vanadium spring steel	0.85
Chromium-nickel-vanadium	1.50
Carbon-vanadium	0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.60c. base per lb. Delivered Detroit, 3.75c., carlots.

CORROSION & HEAT RESISTANT ALLOYS

(Base prices, vents per lb., f.o.b. Pittsburgh)

Chrome-Nickel

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25c.	24c.
Plates	29c.	27c.
Structural shapes	25c.	24c.
Sheets	36c.	34c.
Hot-rolled strip	23.50c.	21.50c.
Cold-rolled strip	30c.	28c.
Drawn wire	25c.	24c.

Straight Chrome

	No. 410	No. 430	No. 442	No. 446
Bars	18.50c.	19c.	22.50c.	27.50c.
Plates	21.50c.	22c.	25.50c.	30.50c.
Sheets	26.50c.	29c.	32.50c.	36.50c.
Hot strip	17c.	17.50c.	23c.	28c.
Cold stp.	22c.	22.50c.	28.50c.	36.50c.

TOOL STEEL

High speed	67c.
High-carbon-chrome	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

British and Continental

BRITISH

Per Gross Ton
f.o.b. United Kingdom Ports

Ferromanganese, export	£20 Nominal
Tin plate, per base box	20s. 3d. to 21s. 6d.
Steel bars, open hearth.	£11
Beams, open-hearth	£10 12s. 6d.
Channels, open-hearth	£10 17s. 6d.
Angles, open-hearth	£10 12s. 6d.
Black sheets, No. 24 gage.	£14
Galvanized sheets, No. 24 gage	£16 15s.

CONTINENTAL

Per Gross Ton, Gold £, f.o.b. Continental Ports

Billets, Thomas	Nominal
Wire rods, No. 5 B.W.G.	£5 10s.
Steel bars, merchant	£5 5s.
Sheet bars	Nominal
Plate ¼ in. and up	£6 7s.
Plate 3/16 in. and 5 mm.	£6 13s.
Sheet, ⅛ in.	£7 9s. 6d.
Beams, Thomas	£4 18s.
Angles (Basic)	£4 18s.
Hoops and strip, base	£5 15s.

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH*

	Base per Lb.
Plates	3.70c.
Structural shapes	3.70c.
Soft-steel bars and small shapes	3.80c.
Reinforcing steel bars	2.45c.
Cold-finished and screw stock:	
Rounds and hexagons	4.15c.
Squares and flats	4.15c.
Hot rolled strip incl. 3/16 in. thick, under 24 in. wide	4.00c.
Hoops	4.50c.
Hot-rolled annealed sheets (No 24), 10 or more bundles	4.50c.
Galv. sheets (No. 24), 10 or more bundles	5.15c.
Hot-rolled sheets (No. 10)	3.75c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$4.48
Spikes, large	1 to 24 kegs $3.65

	Per Cent Off List
Track bolts, all sizes per 100 count	55
Machine bots, 100 count	**
Carriage bolts, 100 count	**
Nuts, all styles, 100 count	**
Large rivets, base per 100 lb.	$4.35
Wire, black, soft ann'l'd, base per 100 lb.	$3.30
Wire, galv. soft, base per 100 lb.	$3.70
Common wire nails, per keg	$2.90
Cement coated nails, per keg	$2.90

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 3999 lb.

* Delivered in Pittsburgh switching district.

** Prices on application.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.75c.
Soft steel bars, rounds	3.85c.
Soft steel bars, squares and hexagons	4.00c.
Cold-fin. steel bars:	
Rounds and hexagons	4.30c.
Flats and squares	4.30c.
Hot-rolled strip	4.10c.
Hot-rolled annealed sheets (No. 24)	4.60c.
Galv. sheets (No. 24)	5.25c.
Spikes (keg lots)	$4.40
Track bolts (keg lots)	5.60
Rivets, structural (keg lots)	**4.95
Rivets, boiler (keg lots)	**5.05

	Per Cent Off List
Machine bolts and carriage bolts, ½ in. and smaller	60
Lag screws	*55 and 5
Hot-pressed nuts, sq. and hex., tap or blank, ½ by 6 in. and smaller	60
Hex. head cap screws	60
Cut point set screws	75
Flat head bright wood screws	62 and 20
Spring cotters	45
Stove bolts in full packages	72½
Rd. hd. tank rivets, 7/16 in. and smaller	55
Wrought washers	$3.75 off list
Black ann'l'd wire per 100 lb. to mfg. trade (No. 14 and heavier)	$4.55
Com. wire nails, 15 kegs or more, per keg	$3.20
Cement c't'd nails, 15 kegs or more, per keg	$3.20

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 3999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.

* These are quotations delivered to city trade for quantities of 100 lb. or more. For lots of less than 100 lb., the quotation is 60 per cent off. Discounts applying to country trade are 70 per cent off, f.o.b. Chicago, with full or partial freight allowed up to 50c. per 100 lb.

** Base at 100 lb.

NEW YORK

	Base per Lb.
Plates, ¼ in. and heavier	4.02c.
Structural shapes	3.99c.
Soft steel bars, round	4.16c.
Iron bars, Swed. charcoal	7.50 to 8.25c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	4.61c.
Flats and squares	4.61c.
Cold-rolled: strip, soft and quarter hard	3.96c.
Hoops	4.36c.
Bands	4.36c.
Hot-rolled sheets (No. 10)	4.00 to 4.11c.
Hot-rolled ann'l'd sheets (No. 24*)	4.50 to 4.75c.
Galvanized sheets (No. 24*)	5.25c.
Long terne sheets (No. 24)	5.50 to 6.20c.
Armco iron, galv. (No. 24†)	6.25c.
Toncan iron, galv. (No. 24†)	6.25c.
Galvanneal (No. 24†)	6.50c.
Armco iron, hot-rolled annealed (No. 24†)	5.65c.
Toncan iron, hot-rolled annealed (No. 24†)	5.65c.
Armco iron hot-rolled (No. 10†)	4.60c.
Toncan iron, hot-rolled (No. 10†)	4.60c.
Cold-rolled sheets (No. 20) for quantities 400 to 1499 lb.	
Standard quality	5.20c.
Deep drawing	5.85c.
Stretcher leveled	5.85c.
SAE, 2300, hot-rolled	7.84c.
SAE, 3100, hot-rolled	6.39c.
SAE, 6100, hot-rolled, annealed	10.54c.
SAE, 2300, cold-rolled	9.04c.
SAE, 3100, cold-rolled, annealed	8.59c.
Floor plate, ⅛ in. and heavier	5.62c.
Standard tool steel	12.50c.
Wire, black, annealed (No. 9)	4.65c.
Wire, galv. (No. 9)	5.00c.
Tire steel, 1 x ⅛ in. and larger	4.61c.
Open-hearth spring steel	4.75c. to 10.25c.
Common wire nails, per keg in 25 keg lots	$3.25

	Per Cent Off List
Machine bolts, square head and nut: All diameters. Prices on application	
Carriage bolts, cut thread: All diameters. Prices on application	

* For 1500 lb. or more; add 0.25c. on smaller lots. No. 28 and lighter, 36 in. wide, 20c. per 100 lb. higher.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	4.02c.
Bars, soft steel (rounds and flats)	4.12c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	4.27c.
Cold-fin. rounds, shafting, screw stock	4.57c.
Hot-rolled annealed sheets (No. 24)	4.87c.
Galv. sheets (No. 24*)	5.52c.
Hot-rolled sheets (No. 10)	4.12c.
Black corrug. sheets (No. 24*)	4.92c.
2 galv. corrug. sheets	5.57c.
Structural rivets	5.32c.
Boiler rivets	5.42c.

	Per Cent Off List
Tank rivets, 7/16 in. and smaller	50
Machine and carriage bolts, lag screws, fitting up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, nuts; all quantities	60

* No. 26 and lighter take special prices.

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	3.92c.
*Structural shapes	3.92c.
*Soft steel bars, small shapes, iron bars (except bands)	4.03c.
‡Reinforc. steel bars, square and deformed	3.46c.
Cold-finished steel bars	4.56c.
*Steel hoops	4.63c.
*Steel bands, No. 12 and 3/16 in. incl.	4.13c.
*Spring steel	5.50c.
†Hot-rolled anneal. sheets (No. 24)	4.65c.
†Galvanized sheets (No. 24)	4.90c.
*Hot-rolled annealed sheets (No. 10)	4.03c.
*Diam. pat. floor plates, ¼ in.	5.25c.

These prices are for delivery in Philadelphia trucking area.

* Base prices subject to deduction on orders aggregating 4000 lb. or over.

† For 25 bundles or over.

‡ For less than 2000 lb.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.89c.
Soft steel bars	3.75c.
Reinfor. bars (under 2000 lb.)	3.00c.
Cold-fin. bars (1000 lb., over)	4.30c.
Hot-rolled strip, 6 in. wide and under	4.19c.
Cold-finished strip	3.60c.
Hot-rolled annealed sheets No. 24 (under 1500 lb.)	4.69c.
Galvanized sheets (No. 24)	5.34c.
Hot-rolled sheets (No. 10)	3.94c.
Hot-rolled 3/16 in., 24 to 48 in. wide sheets	3.94c.
Floor plates, 3/16 in. and heavier	5.49c.
*Black ann'l'd wire, per 100 lb.	$3.40
*No. 9 galv. wire, per 100 lb.	3.80
*Com. wire nails, base per keg	2.95

	Per Cent Off List
Machine and carriage bolts, small	65 and 5
Large (to and incl. 1 in. diam.)	60 and 10
1⅛ in. and larger	60 and 5
Nuts, 100 count	
½ in. and smaller	65 and 5
9/16 in. to 1 in.	60 and 5 and 5
1⅛ in. and larger	60 and 5

* For 5000 lb. or less.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.95c.
Floor plates	5.55c.
Bars, rounds, flats and angles	4.05c.
Other shapes	4.20c.
Rail steel reinforc. bars	3.75
Hoops and bands, 3/16 in. and lighter	4.25c.
Cold-finished bars	4.50c.
Hot-rolled annealed sheets (No. 24) 3500 lb. or more	4.60c.
Galv. sheets (No. 24) 3500 lb. or more	$5.25
Hot-rolled sheets (No. 10)	4.00c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over)	$3.48
Com. wire nails, base per keg: Any quantity less than carload.	3.20
Cement c't'd nails, base 100-lb. keg.	3.50
Chain, lin. per 100 lb.	8.35

	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$21.80
4-in.	52.45
Lap-welded steel boiler tubes. 2-in.	20-7½
4-in.	48.41

BUFFALO

	Base per Lb.
Plates	3.95c.
Floor plates	5.55c.
Struc. shapes	3.80c.
Soft steel bars	3.90c.
Reinforcing bars	3.00c.
Cold-fin. flats and sq. Rounds and hex.	4.35c. 4.35c.
Cold-rolled strip steel	3.82c.
Hot-rolled annealed sheets (No. 24)	4.83c.
Heavy hot-rolled sheets (3/16 in., 24 to 48 in. wide)	4.00c.
Galv. sheet (No. 24)	5.38c.
Bands	4.25c.
Hoops	4.25c.
Heavy hot-rolled sheets	4.00c.
Com. wire nails, base per keg	$3.26
Black wire, base per 100 lb. (2500-lb. lots or under)	4.55c.
(Over 2500 lb.)	4.45c.

BOSTON

	Base per Lb.
Channels, angles	4.26c.
Tees and zees, under 3 in.	4.51c.
H beams and shapes	4.10c.
Plates — Sheared, tank and univ. mill, ¼ thick and heavier	4.11 to 4.61c.
Floor plates, diamond pattern	5.76c.
Bar and bar shapes (mild steel)	4.26c.
Bands 3/16 in. thick and No. 12 ga. incl.	4.46 to 5.46c.
Half rounds, half ovals, ovals and bevels	5.51c.
Tire steel	5.51c.
Cold-rolled strip steel	3.86c.
Cold-finished rounds, squares and hexagons	4.71c.
Cold-finished flats	4.71c.
Blue annealed sheets, No. 10 ga.	4.21c.
One pass cold-rolled sheets No. 24 ga.	5.16c.
Galvanized steel sheets, No. 24 ga.	5.15c.
Lead coated sheets, No. 24 ga.	6.61c.

Price delivered by truck in metropolitan Boston, subject to quantity differentials.

DETROIT

	Base per Lb.
Soft steel bars	3.94c.
Structural shapes	3.95c.
Plates	3.95c.
Floor plates	5.55c.
Hot-rolled annealed sheets (No. 24)*	4.69c.
Hot-rolled sheets (No. 10)	3.94c.
Galvanized sheets (No. 24)**	5.40c.
Bands and hoops	4.19c.
Cold-finished bars	4.30c.
Cold-rolled strip	3.78c.
Hot-rolled alloy steel (S.A.E. 3100 Series)	6.44c.

Quantity differential on bars, plates, structural shapes, bands, hoops, floor plates and heavy hot-rolled: Under 100 lb., 1.50c. over base; 100 to 399 lb., base plus .50c.; 400 to 3999 lb. base; 4000 to 9999 lb., base less .10c.; 10,000 lb. and over, less .15c.

* Under 400 lb., .50c. over base, 400 to 1499 lb., base; 1500 to 3499 lb., base less .10c.; 3500 lb. and over, base less .15c.

** In Detroit only, 1500 to 3749 lb., base less 0.25c.; 3750 to 7499 lb., base less 0.40c.; 7500 lb. and over, base less 0.60c.

Prices delivered by truck in metropolitan Detroit, subject to quantity differentials covering shipment at one time.

Galvanized and hot-rolled annealed may not be combined to obtain quantity deductions.

MILWAUKEE

	Base per Lb.
Plates and structural shapes	3.88c.
Soft steel bars, rounds up to 8 in., flats and fillet angles	3.98c.
Soft steel bars, squares and hexagons	4.13c.
Hot-rolled strip	4.23c.
Hot-rolled annealed sheets (No. 24)	4.73c.
Galvanized sheets (No. 24)	5.38c.
Cold-finished steel bars	4.43c.
Structural rivets (keg lots)	5.18c.
Boiler rivets, cone head (keg lots)	5.28c.
Track spikes (keg lots)	4.63c.
Track bolts (keg lots)	5.83c.
Black annealed wire (No. 6 to No. 9 incl.)	3.85c.
Com. wire nails and cement coated nails 100 to 4999 lb.	3.30c.

	Per Cent Off List
Machine bolts and carriage bolts, ½x6 and smaller or shorter	65
Larger and longer up to 1 in., diam.	60–5
1⅛ in. and larger	60
Coach and lag screws	60–5
Hot-pressed nuts, sq. and hex. tapped or blank, 1–199 lb.	50
200 lb. and over:	
½ in. and smaller	62½
9/16 to 1 in.	60
1⅛ in. and over	50–10

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 3999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on orders of 400 to 1500 lb. On cold-finished bars the prices are for orders of 1000 lb. or more of a size.

ST. PAUL

	Base per Lb.
Mild steel bars, rounds	4.10c.
Structural shapes	4.00c.
Plates	4.00c.
Cold-finished bars	4.83c.
Hot-rolled annealed sheets, No. 24	4.75c.
Galvanized sheets, No. 24	5.00c.

On mild steel bars, shapes and plates the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

BIRMINGHAM

Bars and bar shapes	$3.85	base
Structural shapes and plates	3.75	"
Hot rolled sheets No. 10 ga.	3.80	"
Hot rolled sheets No. 24 ga.	4.40	" 3500 lb. and over
Galvanized sheets No. 24 ga.	5.05	" 3500 lb. or more
Strip	4.05	"
Reinforcing bars	3.85	"
Floor plates	5.96	"
Cold finished bars	4.91	"
Machine and carriage bolts	50 & 10 off list	
Rivets (structural)	$4.60 base	

On plates, shapes, bars, hot-rolled strip, heavy hot-rolled sheets, the base applies on 400 to 3999 lb. All prices are f.o.b. consumer's plant.

BALTIMORE

	Base per Lb.
Mild steel bars and small shapes	4.00c.
Structural shapes	3.90c.
Reinforcing bars, 5 to 15 tons.	3.04c.
Plates	3.90c.
Hot-rolled sheets, No. 10	3.95c.
Bands	4.20c.
Hoops	4.45c.
Special threading steel	4.15c.
Checkered floor plates ¼ in. and heavier	5.50c.
Galvanized sheets, No. 24, 100 bdls. or more	$4.70
Cold-rolled rounds, hexagons, squares and flats, 1000 lb. and more	$4.50

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets the base applies on orders 400 to 1999 lb.

All prices are f.o.b. consumers' plants.

For second zone add 10c. per 100 lb. for trucking.

Quantity differentials on the basis of combined weight of hot rolled products ordered in one day: Under 100 lb., add $1; 100 to 399 lb., add 50c.; 400 to 1999 lb., base; 2000 to 9999 lb., deduct 20c.; 10,000 to 39,999 lb., deduct 30c.; 40,000 lb. and over, deduct 40c.

CHATTANOOGA

	Base per Lb.
Mild steel bars	4.25c.
Iron bars	4.25c.
Reinforcing bars	4.25c.
Reinforcing shapes	4.15c.
Plates	4.15c.
Hot-rolled sheets No. 10	4.20c.
Hot-rolled annealed sheets, No. 24*	4.10c.
Galvanized sheets No. 24*	4.70c.
Steel bands	4.45c.
Cold-finished bars	4.93c.

* Plus mill item extra.

MEMPHIS

	Base per Lb.
Mild steel bars	4.35c.
Shapes, bar size	4.35c.
Iron bars	4.35c.
Structural shapes	4.25c.
Plates	4.25c.
Hot-rolled sheets, No. 10	4.30c.
Hot-rolled annealed sheets, No. 24	4.95c.
Galvanized sheets, No. 24	5.70c.
Steel bands	4.60c.
Cold-drawn rounds	4.86c.
Cold-drawn flats, squares, hexagons	6.86c.
Structural rivets	5.25c.
Bolts and nuts, per cent off list	55
Small rivets, per cent off list	55

NEW ORLEANS

	Base per Lb.
Mild steel bars	4.20c.
Reinforcing bars	3.24c.
Structural shapes	4.10c.
Plates	4.10c.
Hot-rolled sheets, No. 10	4.35c.
Steel bands	4.75c.
Cold-finished steel bars	5.10c.
Structural rivets	4.85c.
Boiler rivets	4.85c.
Common wire nails, base per keg	$3.55
Bolts and nuts, per cent off list	60

PACIFIC COAST

	Base per Lb. San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	4.05c.	4.30c.	4.25c.
Shapes, standard	4.05c.	4.30c.	4.25c.
Soft steel bars	4.20c.	4.30c.	4.45c.
Reinforcing bars, f.o.b. cars dock Pacific ports	2.975c.	2.975c.	2.975c.
Hot-rolled annealed sheets (No. 24)	5.15c.	5.05c.	5.35c.
Hot-rolled sheets (No. 10)	4.30c.	4.50c.	4.50c.
Galv. sheets (No. 24 and lighter)	5.85c.	5.25c.	5.90c.
Galv. sheets (No. 22 and heavier)	6.10c.	5.45c.	5.90c.
Cold-finished steel Rounds	6.80c.	6.85c.	7.10c.
Squares and hexagons	8.05c.	8.10c.	7.10c.
Flats	8.55c.	8.60c.	8.10c.
Common wire nails—base per keg less carload	$3.40	$3.20	$3.40

All items subject to differentials for quantity.

REFRACTORIES PRICES

Fire Clay Brick

	Per 1000 f.o.b. Works
First quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	$54.00
First quality, New Jersey	56.00
Select, Ohio	49.00
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	49.00
Second quality, New Jersey	51.00
No. 1, Ohio	46.00
Ground fire clay, per ton	8.00

5 per cent trade discount on fire clay brick, except for New Jersey, quoted at net price.

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$54.00
Chicago District	63.00
Birmingham	54.00
Silica cement per net ton (Eastern)	9.50

5 per cent trade discount on silica brick.

Chrome Brick

	Per Net Ton
Standard f.o.b. Baltimore, Plymouth Meeting and Chester	$49.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	49.00

Magnesite Brick

	Per Net Ton
Standard f.o.b. Baltimore and Chester	$69.00
Chemically bonded, f.o.b. Baltimore	59.00

Grain Magnesite

	Per Net Ton
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	$45.00
Domestic, f.o.b. Baltimore and Chester, in sacks	43.00
Domestic, f.o.b. Chewelah, Wash.	25.00

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	$25.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	25.00
Delivered Brooklyn	27.50
Delivered Newark or Jersey City	26.53
Delivered Philadelphia	25.84
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Buffalo, Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	24.00
Delivered Cincinnati	24.44
F.o.b. Duluth	24.50
F.o.b. Provo, Utah	22.00
Delivered, San Francisco, Los Angeles or Seattle	26.95
F.o.b. Birmingham*	20.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 0.70 per cent and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic

F.o.b. Everett, Mass.	$25.25
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	24.50
F.o.b. Buffalo	23.00
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	23.50
Delivered Cincinnati	24.61
Delivered Canton, Ohio	24.89
Delivered Mansfield, Ohio	25.44
F.o.b. Birmingham	19.00

Bessemer

F.o.b. Everett, Mass.	$26.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	26.00
Delivered Boston Switching District	26.50
Delivered Newark or Jersey City	27.53
Delivered Philadelphia	26.76
F.o.b. Buffalo and Erie, Pa., and Duluth	25.00
F.o.b. Neville Island and Sharpsville, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago	24.50
F.o.b. Birmingham	25.00
Delivered Cincinnati	25.61
Delivered Canton, Ohio	25.89
Delivered Mansfield, Ohio	26.44

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.	$28.50

Gray Forge

Valley or Pittsburgh furnace	$23.50

Charcoal

Lake Superior furnace	$27.00
Delivered Chicago	30.34

Canadian Pig Iron

Per Gross Ton

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$26.50
No. 2 fdy., sil. 1.75 to 2.25	25.50
Malleable	26.00
Basic	25.50

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$27.50
No. 2 fdy., sil. 1.75 to 2.25	27.00
Malleable	27.50
Basic	27.00

FERROALLOYS

Ferromanganese

F.o.b New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload)	$102.50

Spiegeleisen

Per Gross Ton Furnace

Domestic 19 to 21%	$33.00
F.o.b. New Orleans	33.00

Electric Ferrosilicon

Per Gross Ton Delivered; Lump Size

50% (carload lots, bulk)	$69.50*
50% (ton lots in 50 gal. bbl.)	80.50*
75% (carload lots, bulk)	126.00*
75% (ton lots in 50 gal. bbl.)	139.00*

Bessemer Ferrosilicon

F.o.b. Furnace, Jackson, Ohio

Per Gross Ton

10.00 to 10.50%	$33.50

For each additional 0.50% silicon up to 17%, 50c. per ton is added.

Manganese 2 to 3%, $1 per ton additional. For each unit of manganese over 3%, $1 per ton additional. Phosphorus 0.75% or over, $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 5.00 to 5.50%	$27.50

For each additional 0.5% silicon up to 17%, 50c. a ton is added.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per lb. Contained Cr., Delivered Carlots, Lump Size, on Contract

4 to 6% carbon	10.50c.*
2% carbon	16.50c.*
1% carbon	17.50c.*
0.10% carbon	19.50c.*
0.06% carbon	20.00c.*

Silico-manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon	$101.50*
2.50% carbon	106.50*
2% carbon	111.50*
1% carbon	121.50*

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads, nominally	$2.00
Ferrotungsten, lots of 500 lbs. nominaliy	2.05
Ferrotungsten, smaller lots, nominally	2.10
Ferrovanadium, contract, per lb. contained V., delivered	$2.70 to $2.90†
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., tons lots.	$2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	$157.50
Ferrophosphorus, electric or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic, 23-26% in car lots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, $3 unitage, freight equalized with Nashville	$75.00
Ferromolybdenum, per lb. Mo. f.o.b. furnace	95c.
Calcium molybdate, per lb. Mo. f.o.b. furnace	80c.

*Spot prices are $5 per ton higher
†Spot prices are 10c. per lb. of contained element higher.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, Bessemer, 51.50%	$5.25
Old range, non-Bessemer, 51.50%	5.10
Mesabi, Bessemer, 51.50%	5.10
Messabi, non-Bessemer, 51.50%	4.95
High phosphorus, 51.50%	4.85

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit

Iron, low phos., copper free, 55 to 58% dry, Algeria, nominal.	17.00c.
Iron, low phos., Swedish, average, 68½% iron. Nominally 17 to 18c.	
Iron, basic or foundry, Swedish, aver. 65% iron. Nominally 15c.	
Iron, basic or foundry, Russian, aver. 65% iron	Nominal
Man., Caucasian, washed 52%	45c.
Man., African, Indian, 44-48%	40c.
Man., African, Indian, 49-51%	Nominal
Man., Brazilian, 46 to 48½%	Nominally 40c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered	$19.00
Tungsten, domestic, scheelite delivered	$16.00 to $19.00
Chrome ore (lump) c.i.f. Atlantic Seaboard, per gross ton: South African (low grade)	$16.00
Rhodesian, 45%	22.00
Rhodesian, 48%	25.50
Turkish, 48-49%	25.00 to $26.00
Turkish, 45-46%	23.50 to 24.00
Turkish, 44%	19.00 to 19.50
Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton: 50%	$25.50 to $26.50
48-49%	25.50 to 26.00

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	$18.00 to $19.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	20.00
Foreign, 85% calcium, fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	24.50
Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	31.50

FUEL OIL

Per Gal.

F.o.b. Bayonne or Baltimore, No. 3 distillate	4.75c.
F.o.b. Bayonne or Baltimore, No. 4 industrial	4.75c.
Del'd Ch'go, No. 3 industrial	4.15c.
Del'd Ch'go, No. 5 industrial	4.00c.
Del'd Cleve'd, No. 3 distillate	5.75c.
Del'd Cleve'd, No. 4 industrial	5.625c.
Del'd Cleve'd, No. 5 industrial	3.50c.

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, Prompt	$4.00 to $4.25
Furnace, f.o.b. Connellsville, Prompt	5.00 to 6.25
Foundry, by-product, Chicago ovens	10.25
Foundry, by-product, del'd New England	12.50
Foundry, by-product, del'd Newark or Jersey City	10.88 to 11.40
Foundry, by-product, Philadelphia	10.95
Foundry, by-product, delivered Cleveland	11.05
Foundry, by-product, delivered Cincinnati	10.50
Foundry, Birmingham	7.50
Foundry, by-product, del'd St. Louis industrial district	11.00 to 11.50
Foundry, from Birmingham, f.o.b. cars dock, Pacific ports	14.75

....PIPE LINES....

Stanolind Pipe Line Co., Philcade Building, Tulsa, Okla., plans over 50 miles of 2 and 4-in. steel pipe line gathering system in Stafford, Kan., oil field area. Cost close to $100,000 with booster station facilities.

Producers Natural Gas Pipe Line Co., Mount Pleasant, Mich., has applied for permission to build new welded steel pipe line in Mecosta County, Mich., gas field area for natural gas transmission, to connect with main pipe line system of company.

San Joaquin Light & Power Corp., Fresno, Cal., plans welded steel pipe lines from Merced to Atwater and Livingston, Merced County, Cal., about 13½ miles, for high-pressure gas transmission and will carry out project with company forces. Cost over $125,000.

Del Ray Producing Co., Houston, Tex., R. R. Dean, vice-president, plans welded steel pipe line for natural gas transmission to new casinghead gasoline plant in Sandy Point district, Brazoria County, Tex. Line will have a rated capacity for handling about 20,000,000 cu. ft. per day.

Metropolitan Utilities District, Eighteenth and Harney Streets, Omaha, Neb., plans pipe lines for gas distribution in district No. 839, recently established. T. H. Leisen is secretary.

Humble Pipe Line Co., Houston, Tex., plans new welded steel pipe line from Cedar Point oil field, Galveston Bay, to Goose Creek, about six miles, for crude oil transmission. Connection will be made at latter place with main pipe line system of company.

United States Engineer Office, Navy Building, Washington, will take bids soon for pipe line for gasoline and oil systems in East section of Nos. 1 and 2 yacht basins in Potomac River, along north side of Washington channel, District of Columbia, in connection with improvements in waterfront in that area, for which bids will be called at same time. Work will include pipe lines for water system, steel piling, bulkhead wall, etc.

..CAST IRON PIPE..

Williamsport Water Co., Williamsport, Pa., plans about one and one-half miles of 8-in. pipe in Grampian Boulevard, for extensions in main water system; also smaller size for service lines in same area.

Crescent, Okla., plans about 2300 lin. ft. of 4-in. for water system, and will make other extensions and improvements in waterworks, including new two-story waterworks building. Fund of about $140,000 will be arranged.

Wadesboro, N. C., plans pipe lines for extensions in water system and other waterworks installation. A special election has been called May 24 to approve bonds for $150,000 for project.

Long Beach, Cal., will take bids soon on about 1248 lin. ft. of 6-in. pipe for extensions in water system. C. M. Dorton is city manager.

Clay City, Ill., will take bids this month for pipe lines for water system and other waterworks installation. Cost about $75,000. Russell & Axon, 4903 Delmar Boulevard, St. Louis, are consulting engineers.

Board of Yellowstone County Commissioners, Billings, Mont., has let contract to American Cast Iron Pipe Co. for 4200 ft. of 8-in., and 250 ft. of 6-in. pipe for extensions in water system.

Pass Christian, Miss., plans pipe line extensions and replacements in water system. Fund of $40,000 has been arranged through bond issue and Federal aid.

Bellaire, Tex., plans about 2000 ft. of 6-in. for extensions in water system to new district being developed by Westmoreland Development Co., Houston, Tex., which will install distributing lines.

East Peoria, Ill., plans pipe lines for extensions in water system; also new elevated steel tank and tower. Kinsey Engineering Co., Pekin, Ill., is consulting engineer.

Melrose, Wis., plans pipe lines for water system and other waterworks installation. Cost about $38,000. Bond issue has been voted in that amount. Frank J. Davy & Son, 1611 Main Street, LaCrosse, Wis., are consulting engineers.

Board of Wyandotte County Commissioners, Kansas City, Kan., has plans for pipe lines for water system in parts of Quindaro Township. Cost about $280,000 with other waterworks installation. Charles Haskins, Finance Building, Kansas City, Mo., is consulting engineer.

Lewiston, Mont., will take bids soon for about 30,500 ft. for extensions and replacements in water system. J. M. Schmidt, City Hall, is city engineer.

Valley Falls, Kan., plans pipe line extensions and improvements in water system, including new dam on Delware River for water source and new purification plant. Paulette & Wilson, 1006 Kansas Avenue, Topeka, Kan., and Farmers' Union Building, Salina, Kan., are consulting engineers.

Two Harbors, Min., plans pipe line extensions in water system. Fund of $47,000 is being arranged through Federal aid for this and other waterworks installation. Leland Clapper is city engineer.

San Francisco has awarded 400 tons of 8-in. pipe to U. S. Pipe & Foundry Co., San Francisco.

Burbank, Cal., has announced that U. S. Pipe & Foundry Co., San Francisco, is low bidder on 190 tons of 6, 8, and 20-in. pipe, class 250.

United States Treasury Procurement Office, San Francisco, has opened bids on 188 tons of 8-in. pipe, class 250, for delivery at Oakland, Cal.

Newton, Mass., has awarded 7000 ft. of 12-in. pipe to R. D. Wood & Co.

Holyoke, Mass., has awarded 4000 ft. of 8-in. to U. S. Pipe & Foundry Co.

Grand Coulee Dam, Wash., has awarded 2000 tons of cast iron pipe to United States Pipe & Foundry Co., Burlington, N. J.

"Now take this little *job* for instance..."

Don't you just love to hear an automobile salesman talk like that about one of the latest automobile creations?

You know what we mean—"This *job* has round tires as standard equipment . . . that *job* over there comes complete with paint on it . . . ", and so on.

It's the wrong use of the word *job* that gets us. By *job*, WE mean something like handling spent pickle liquor, or chromium plating solutions, or sulphuric acid *au naturel*.

Now *that* is a *job*. And say, we have the nicest little jobs you ever saw for doing just that. They're Duriron Centrifugal Pumps . . . swell for use with acid solutions because they are strongly resistant to the action of the acid . . . and they don't contaminate the solution, either.

And that isn't all. You can get such accessories as valves, pipe and fittings, steam jets, ejectors, heat exchangers, for use with acid solutions.

Just to be sure you're not overlooking any bets, send for Bulletins on equipment in which you might be interested. They are kinda dry reading, what with Spring coming on and everything, but they have technical information of the kind you want when you are figuring on making replacements or changes.

THE DURIRON COMPANY, Inc.
438 N. Findlay Street Dayton, Ohio

. . .NON-FERROUS. . .

. . . Demand for all metals tapers substantially . . . Zinc price lowered to 4.15c., New York; week's sales only 934 tons . . . Tin prices establish new five year lows.

NEW YORK, May 3.—Sales of non-ferrous metals in the past week, both here and abroad, showed the effects of the adverse trade sentiment engendered by the weak stock market and the continued absence of encouraging news concerning the industrial situation. The volume of foreign business, which has been the mainstay of the copper market for some time, dropped considerably in the past week, but is still the dominant factor in the copper market as domestic consumers show little inclination to buy. Prices abroad declined during the week to 9.55c. per lb. c.i.f., usual Continental base ports, Monday's closing price, as compared with 9.90c. a week ago. Domestic sales in the past week were 4900 tons against 5943 in the preceding week. Total sales for the month of April were 22,800 tons. Quotations here are unchanged at 10c. per lb., Connecticut Valley, for electrolytic metal.

The Week's Prices. Cents Per Pound for Early Delivery

	Apr. 27	Apr. 28	Apr. 29	Apr. 30	May 2	May 3
Electrolytic copper, Conn.*	10.00	10.00	10.00	10.00	10.00	10.00
Lake copper, N. Y.	10.125	10.125	10.125	10.125	10.125	10.125
Straits tin, spot, New York	37.50	37.25	36.60	....	35.00	34.80
Zinc, East St. Louis	4.15	4.15	4.15	4.15	4.15	4.15
Zinc, New York	4.54	4.54	4.54	4.54	4.54	4.54
Lead, St. Louis	4.35	4.35	4.35	4.35	4.35	4.35
Lead, New York	4.50	4.50	4.50	4.50	4.50	4.50

*Delivered Connecticut Valley; price ¼c. lower delivered in New York.
Aluminum, virgin, 99 per cent plus 20.00c.-21.00c. a lb., delivered.
Aluminum No. 12 remelt No. 2 standard, in carloads, 19.00c. to 19.50c. a lb., delivered.
Nickel, electrolytic, 35c. to 36c. a lb. base refinery, in lots of 2 tons or more.
Antimony, Asiatic, 15.25c. a lb., prompt, f.o.b., New York.
Antimony, American, 13.25c. per lb., prompt shipment, New York.
Quicksilver, $70.00 to $71.00 per flask of 76 lb.
Brass ingots, commercial 85-5-5-5, 10.25c. a lb., less carload, delivered in Middle West ¼c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	36.50c. to 37.50c.
Tin, bar	38.50c. to 39.50c.
Copper, Lake	11.00c. to 12.00c.
Copper, electrolytic	11.00c. to 12.00c.
Copper, castings	10.50c. to 10.75c.
*Copper sheets, hot-rolled	18.125c.
*High brass sheets	16.375c.
*Seamless brass tubes	19.125c.
*Seamless copper tubes	18.625c.
*Brass rods	12.375c.
Zinc, slabs	6.25c. to 7.25c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	10.75c.
Lead, American pig	5.50c. to 6.50c.
Lead, bar	6.625c. to 7.625c.
Lead, sheets, cut	7.75c.
Antimony, Asiatic	15.50c. to 16.50c.
Alum., virgin, 99 per cent plus	22.50c. to 24.00c.
Alum., No. 1 for remelting, 98 to 99 per cent.	19.50c. to 21.00c.
Solder, ½ and ½	28.00c. to 30.00c.
Babbitt metal, commercial grade	19.00c. to 49.00c.

*These prices, which are also for delivery from Chicago and Cleveland warehouses, are quoted with 25 per cent allowed off for extras, except copper sheets and brass rods, on which allowance is 40 per cent.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	39.25c.
Tin, bar	41.25c.
Copper, Lake	11.00c. to 11.25c.
Copper, electrolytic	11.00c. to 11.25c.
Copper, castings	10.75c.
Zinc, slabs	6.25c. to 6.50c.
Lead, American pig	5.00c. to 5.25c.
Lead, bar	8.25c.
Antimony, Asiatic	18.50c.
Babbitt metal, medium grade	16.50c.
Babbitt metal, high grade	43.25c.
Solder, ½ and ½	23.50c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	7.625c.	8.375c.
Copper, hvy. and wire	6.875c.	7.375c.
Copper, light and bottoms	6.125c.	6.375c.
Brass, heavy	4.00c.	4.50c.
Brass, light	3.00c.	3.75c.
Hvy. machine composition	6.25c.	6.75c.
No. 1 yel. brass turnings	4.375c.	4.875c.
No. 1 red brass or compos. turnings	5.875c.	6.375c.
Lead, heavy	3.50c.	3.875c.
Cast aluminum	6.00c.	7.25c.
Sheet aluminum	10.50c.	12.00c.
Zinc	2.00c.	3.25c.

Tin

In sympathy with the weakness in other metals, there was very little tin buying in the past week. Prices declined progressively from 37.50c. on Wednesday to 34.80c., today's quotation on Straits metal for prompt shipment. This latter price is the lowest since May, 1933, and many sellers doubt if the bottom has yet been reached. The average quotation for the past week was 36.23c., down 2.1c. from the previous figure. Domestic tin deliveries in April were 3745 tons, as compared with 4555 tons in March and 6995 tons in April, 1937.

Zinc

Prime Western sales for the week dropped to 934 tons, or slightly more than a third of the previous week's volume. Shipments for the week were 3205 tons against 2636 in the previous period, and undelivered orders at the end of the week amounted to 25,634 tons. On Wednesday a bid for a round tonnage at 4.15c., E. St. Louis, was accepted by a seller and this basis was shortly afterward acknowledged by the rest of the trade as the basis of current business. Despite the fact that at this price producers are said to lose money on operations, unless market sentiment improves materially the trade would not be surprised to see a further revision downward in prices.

Lead

Buying showed a further recession in the past week, making the third consecutive weekly decline. The week's sales were approximately 14 per cent below the previous week's volume, with May and June being bought in about equal proportion. Lead requirements for May are about 40 per cent covered, indicating that consumers are covering their needs a little earlier in the month than has been the practice in the past. Apparent consumption is still in the neighborhood of 30,000 tons a month and all signs point to another small increase in smelter stocks for April. Quotations are unchanged at 4.50c. per lb., New York.

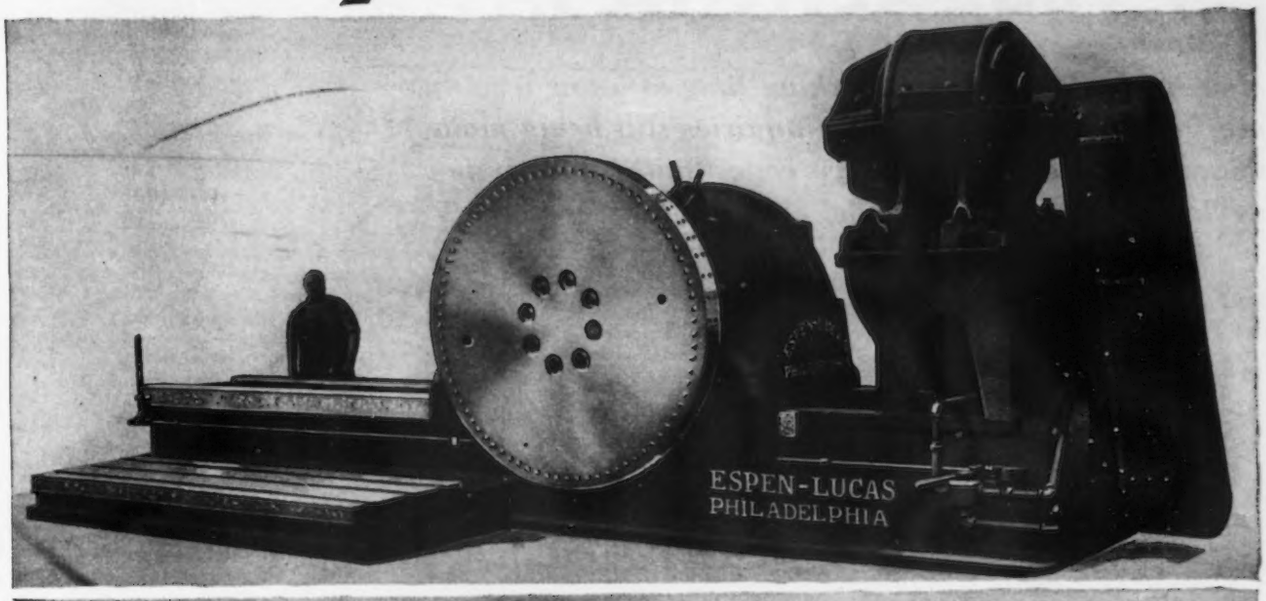
Average Prices

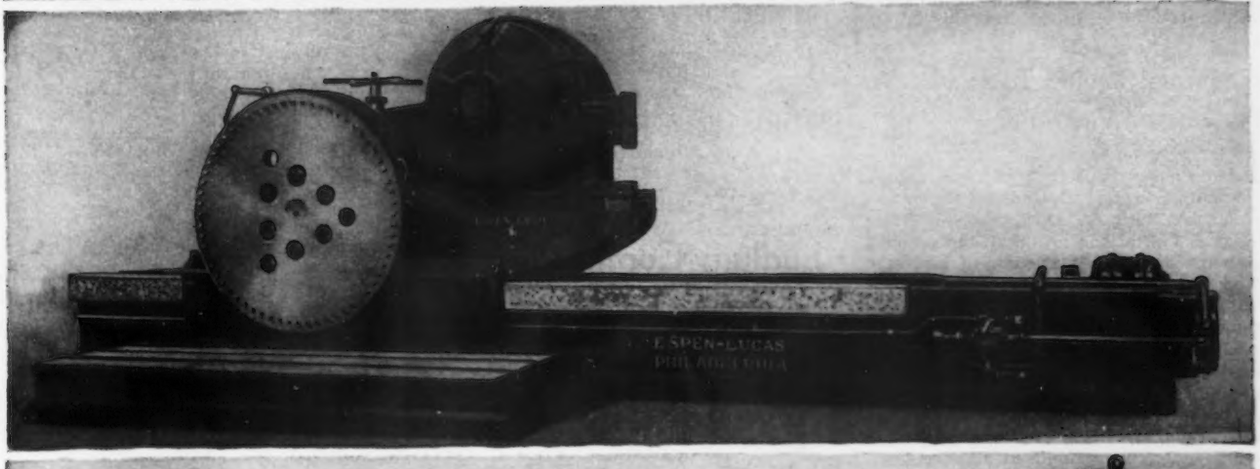
The average prices of the major non-ferrous metals in April, as based on quotations appearing in THE IRON AGE, were as follows:

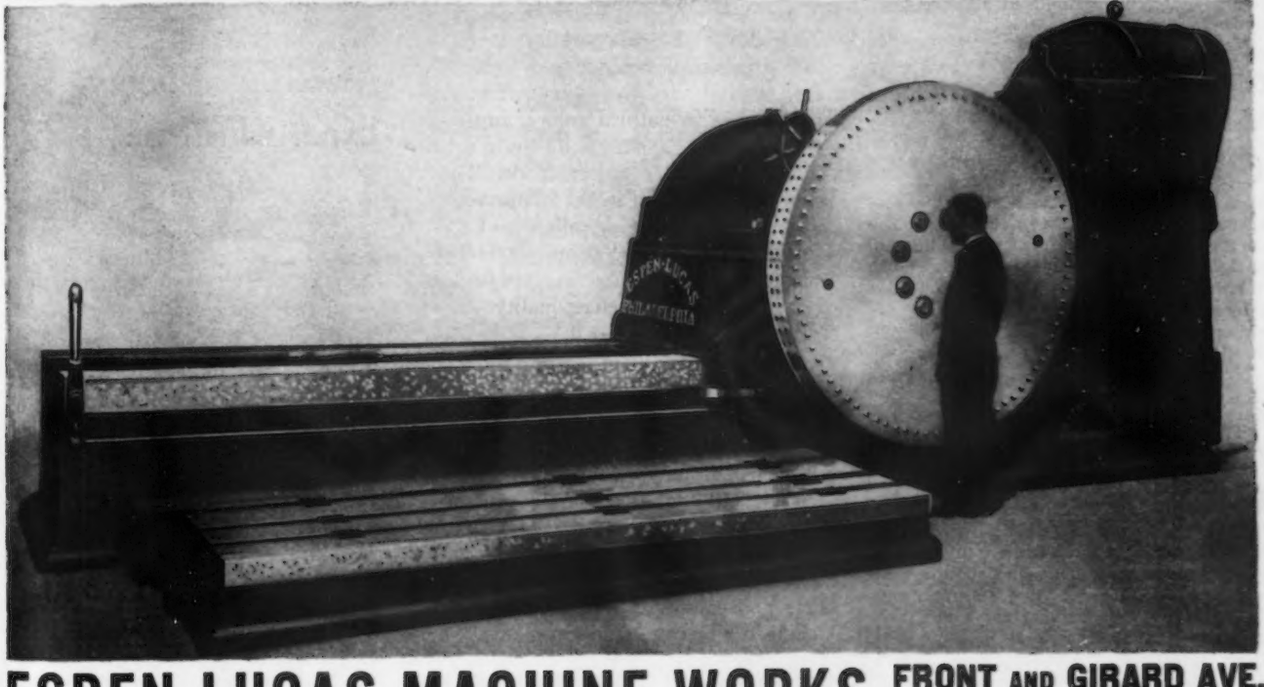
	Per lb.
Electrolytic copper, Conn. Valley	10.00c.
Lake copper, Eastern delivery	10.125c.
Straits tin, spot, New York	38.41c.
Zinc, East St. Louis	4.14c.
Zinc, New York	4.53c.
Lead, St. Louis	4.35c.
Lead, New York	4.50c.

Rotary Planers

All SIZES KINDS FOR BIG WORK







ESPEN-LUCAS MACHINE WORKS

FRONT AND GIRARD AVE.
PHILADELPHIA, PA.

THIS WEEK'S MACHINE . . .TOOL ACTIVITIES. . .

Machine tool orders are marking time at a low level in most districts . . . Volume of inquiries still being maintained . . . Heavy automotive cancellations in last few weeks, as makers limit model changes.

Orders Off, Inquiries Up At Pittsburgh

PITTSBURGH—The improved volume of machine tool business noted a few weeks ago has not held. Orders during the past week were off some and reflect the same type of unimpressive activity which existed previous to recent improvement. On the other hand, inquiries are about as numerous as they have been during the past month. It is quite clear that important increases in machine tool business must await further clarification of the general business situation.

Chevrolet Buying Tools For Detroit Plant

DETROIT—The majority of tool and die shops in Detroit now have some automotive work released to them and are busy with at least part of their forces. Indications are that the amount of work on hand is enough to keep the shops busy for several months at a normal rate. Close check indicates that the automobile programs are confined mostly to changes in dies for front ends, instrument panels, etc. Chevrolet, however, is making an important mechanical change in its knee action front wheel suspension and during the last 30 days has been active in buying equipment for the gear and axle plant in Detroit.

Cincinnati Reports Good Volume of Inquiries

CINCINNATI—A slight increase in domestic machinery demand in this area the past week was offset by a corresponding drop in foreign bookings. The constant flow of inquiry lends a hopeful background to the current market. The quantity of requests indicates a steady interest in tools and presents an encouraging backlog of potential business. Production is unchanged.

Big Automotive Cancellations Affect Cleveland Builders

CLEVELAND—After an upturn in orders during the first half of April, the last two weeks fell below expectations, resulting in a lower total volume of new business during the month than in March, for most machine tool manufacturers here. During the last three days inquiries have been better, however. Manufacturers of airplane and airport equipment, diesel engines and Navy supplies are among the busiest in this district, while several makers of equipment for the steel and rubber industries continue active. The lack of interest from the automotive and railroad field remains most disheartening. Cancellations of heavy machinery from one of the manufacturers near Detroit are estimated at $4,000,000 to $6,000,000 in this district alone in the last two months.

No Definite Trend Seen In Middle West

CHICAGO—Machine tool sellers here report April activity ranging from considerably less to about equal with March. Small tool demand is spotty, with some offices noticing a slight upward trend over the past two weeks. Orders for single machines predominate, no industrial lists having been seen for several months. Most of the tools on the two railroad lists reported a few weeks ago are still pending. Some here feel that business may pick up following the adjournment of Congress.

Sales in the East Still on Bottom

NEW YORK—For most machine tool dealers and factory representatives, sales in the Metropolitan area are still dragging along the bottom. A few machines have been sold here and there, but the business is spotty. Most of the representative manufacturers in this vicinity that did the bulk of the buying in 1937 are definitely out of the market at present. Even firms that have Army and Navy contracts appear to have completed their equipment purchases. The service departments themselves, however, still furnish the chief present and potential market. The Armory at Springfield, Mass., is inquiring for presses, and the Naval torpedo plant at Newport, R. I., is also inquiring for presses and 24-in. cylindrical grinders. The Navy Yard at Charlestown, Mass., also is in the market. The chief project in the East, however, is the torpedo plant at Alexandria, Va., for which releases on machinery have yet to be made.

Ludlum Company Shows New Color Movie Of Stainless Steel

THE Ludlum Steel Co., Watervliet, N. Y., presented a preview of its new motion picture in color on Thursday and Friday of last week at the Museum of Science and Industry, R.C.A. Building, New York. The picture, taken in natural colors, runs for slightly more than an hour, and in this time shows in considerable detail the various operations in the manufacture of stainless steel in rolled and cast forms. The picture demonstrates the efficacy of color in giving operations in a steel plant a lifelike quality.

While the motion picture has no sound accompaniment, a running comment is provided by a Ludlum metallurgist. This method permits the interpolation of technical detail for a technical audience and its omission before a non-technical audience.

Especially good views have been obtained of electric furnace melting both for the production of rolled products and castings. The pictures were taken in all of the Ludlum plants. The concluding reel shows the production and application of Ludlite, the company's new thin gage stainless steel.

The film is available for showing before technical or non-technical organizations. Reservations can be made by addressing the Ludlum Steel Co., Watervliet, N. Y.

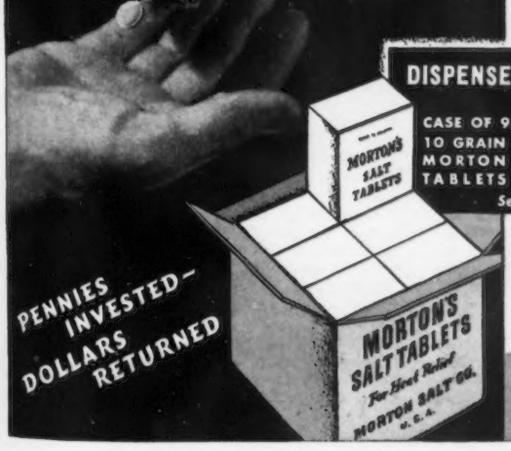
March Machinery Exports Increase

INDUSTRIAL machinery exports in March totaled $25,223,324 and topped shipments in March, 1937 by 44 per cent, according to the machinery division of the Department of Commerce.

Foreign sales of construction and conveying machinery almost doubled comparable 1937 shipments at $2,669,622; power-generating machinery, $1,497,312 against $1,000,028 in March, 1937; metal-working machinery, $8,297,396 against $4,497,750; mining, well and pumping machinery, $6,147,255 compared with $4,510,810; textile, sewing and show machinery, $1,551,991 against $1,564,339; and "other" machinery exports $4,403,077 against $4,114,837 in March of last year.

MORTON'S SALT TABLETS *Drive Out* HEAT-FAG*

This dispenser, and Morton Salt Tablets, represent the most sanitary, economical, and convenient method yet perfected to supply salt to employees. Dirty fingers cannot mark the polished alumilite surface of Morton's dispenser nor can dust or grit collect inside. A special, corrosive-free metal interior keeps tablets snugly dry and a simple push of the lever at the base dispenses tablets, one at a time, without breaking or crumbling. Transparent slot indicates when refill is necessary. Order now — help protect your workers against Heat-Fag.



DISPENSER $4.50

CASE OF 9,000 — 10 GRAIN MORTON TABLETS $3.15

Sent Prepaid

PENNIES INVESTED— DOLLARS RETURNED

*HEAT-FAG—that unseen, strength-sapping force that attacks workers and withers production and profits

Protect your workers — maintain production efficiency and profits! Install Morton Dispensers where all of your employees can conveniently take salt tablets.

Men who sweat *need* salt. The human body, when overheated, cools itself by perspiration. As we perspire, we lose salt and water—and when too much is lost, salt must be replaced or heat-fag results. Otherwise, lack of efficiency and lowered production and profits inevitably follow.

Time and again, this has been established as a *fact* by medical research and practical test in some of the country's leading industries. No wonder, then, that alert, forward-looking executives have insisted that their workers be supplied salt in a convenient, easy-to-take form . . . and that the Morton Dispenser and Morton Salt Tablets are destined to become a fixture throughout American industry. The cost is so small—and the benefits so great, that such is a foregone conclusion.

Only the purest and most highly refined Salt is used in Morton Salt Tablets.

Write for illustrated bulletin "Heat-Fag" for interesting facts on the value and importance of salt to your workers.

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CHICAGO, ILLINOIS

PLANT EXPANSION AND EQUIPMENT BUYING

NORTH ATLANTIC

Accurate Brass Co., Cooper and Wyckoff Avenues, Brooklyn, manufacturer of die castings, forgings and other brass specialties, has approved plans for new one-story plant at Seventy-third Avenue and Eighty-eighth Street, Glendale, L. I., and will begin superstructure at once. Cost close to $45,000 with equipment.

Engstrom Tool Corp., 159 Leonard Street, New York, tools, dies, light steel stampings, etc., has leased a floor in building at 4 Washington Street, for plant, removing present works to new location.

Durham Duplex Razor Co., 511 Fifth Avenue, New York, manufacturer of safety razors and blades, with main plant at Mystic, Conn., has leased a three-story building, about 28,000 sq. ft. of floor space, at last noted place, and will improve for immediate expansion.

Bethlehem Shipbuilding Corp., Ltd., Quincy, Mass., a subsidiary of Bethlehem Steel Co., is concluding negotiations for purchase of dry docks and shipbuilding plants of United Shipyards, Inc., 11 Broadway, New York, comprising its Crane, Shewan and Morse plants in Brooklyn, for a reported consideration of about $10,000,000. Purchasing company will carry out expansion and will operate in conjunction with present shipyards at Fore River, Mass., and Sparrows Point, Md.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 13 for steel bolts and nuts (Schedule 3422), 100 arc welding control panels (Schedule 3417) for Brooklyn Navy Yard; steel floor plates (Schedule 3423) for Brooklyn and Philadelphia yards; 95 arc welding control panels (Schedule 3418) for Philadelphia yard.

United States Engineer Office, Army Building, New York, asks bids until May 10 for two cast steel propellers and two cast steel fairweather caps (Circular 192).

Bach Products, Inc., New York, organized by Oscar B. Bach, 305 East Forty-sixth Street, to manufacture art metal products and novelties, has leased a one-story building at 288 East Eighteenth Street, Paterson, N. J., for new plant.

Commanding Officer, Ordnance Department, Picatinny Arsenal, Dover, N. J., asks bids until May 10 for gate valves and globe valves (Circular 884); until May 11, one motor-driven forced-draft fan, one turbine-driven forced-draft fan and one motor-driven induced draft fan (Circular 886).

Board of Trustees, White Haven Sanatorium Association, White Haven, Pa., has plans for extensions and improvements in power house, including addition, 40 x 40 ft., and installation of equipment. Cost over $100,000. Charles E. Bonine and Henry F. Sanville, Land Title Building, Philadelphia, are consulting engineers.

United States Engineer Office, Custom House, Philadelphia, asks bids until May 9 for steel castings, including hopper gates, intake stuffing boxes, impellers, suction intake, four bin gates, suction pipe nipples, etc. (Circular 388).

BUFFALO DISTRICT

Dolomite Marine Corp., 183 Main Street, East Rochester, N. Y., affiliated with Dolomite Products Co., producer of crushed dolomite, gypsum, etc., has approved plans for first unit of new marine construction plant for steel barges, etc., at Pittsford, N. Y., one-story, 110 x 220 ft. Cost close to $60,000 with equipment. Other units will be built later.

Central School District No. 1, Cuba, N. Y., plans manual training department in new two-story central school to serve Cuba, Clarksville, Belfast, Hinsdale, Lyndon and other municipalities in that area. Bids are being asked on general contract. Cost about $400,000. Financing has been arranged through Federal aid. Bley & Lyman, 505 Delaware Avenue, Buffalo, are architects; Thomas H. McKaig, last noted address, is consulting engineer.

WASHINGTON DIST.

Board of District Commissioners, District Building, Washington, asks bids until May 9 for three engine lathes.

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until May 13 for one tire grooving machine and one tinner's shears (Circular 398-134); until May 19, four pneumatic hammers, seven blacksmith's forges, two pneumatic riveting hammers, one air forge, 280 machinist's vises, four blacksmith's anvils and one blacksmith's vise (Circular 398-133).

Richmond Engineering Co., 1305 Brook Road, Richmond, Va., manufacturer of fabricated steel products, has acquired five one-story buildings on Seventh Street, formerly used by American Locomotive Co., and will remodel for manufacture of air-conditioning and refrigerating equipment, new lines of production for company. Installation will include cranes and crane runways, electric hoists and other mechanical-handling equipment. Cost over $75,000 with equipment.

General Purchasing Officer, Panama Canal, Washington, asks bids until May 13 for one grinding and polishing machine with motor, steel foundry nails, cable, three drafting machines, 12 brass melting crucibles, extension ladders, panelboards, and other equipment (Schedule 3350).

Purchasing Officer, Department of Interior, Washington, asks bids until May 9 for one compost grinder or power-operated soil shredder, with vibrating screens (Circular 3556) for institution at Hot Springs, Ark.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 13 for one motor-driven milling machine (Schedule 3416) for Boston Navy Yard; electric-hydraulic steering gears (Schedule 3398) for Boston, Charleston and Puget Sound yards; four motor-driven compressor sets, four rheostats, four ammeters, four sets of resistances and spare parts (Schedule 3405) for Portsmouth yard; steel cable (Schedule 3383), 346,700 lin. ft. of plow steel wire rope (Schedule 3391), steel welding rods (Schedule 3373) for Eastern and Western yards; one combination machine, contour metal sawing, filing and polishing, motor-driven, floor-type (Schedule 3414) for Sewall's Point yard.

NEW ENGLAND

Board of School Trustees, Chicopee, Mass., has plans for new two-story trade school. Cost about $100,000. Financing has been arranged through Federal aid. Henry J. Tessier, 220 Dwight Street, Springfield, Mass., is architect.

Norma-Hoffman Bearings Corp., Stamford, Conn., has let general contract to Vuono Construction Co., 1 Atlantic Street, for one- and two-story plant additions, each 60 x 90 ft. Cost over $65,000 with equipment. Fletcher-Thompson, Inc., 1336 Fairfield Avenue, Bridgeport, Conn., is architect and engineer.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until May 12 for two vertical, two-spindle, hand-feed drill presses (Circular 211), 10 automatic milling machines (Circular 212).

Hampden Bottling Works, Inc., Pratt Street, Meriden, Conn., has let general contract to H. Wales Lines Co., 134 State Street, for two-story addition to mechanical-bottling plant, 36 x 128 ft. Cost over $50,000 with equipment.

Adj. General's Office, State House, Augusta, Me., will close bids May 13 for a hangar machine shop. Nisbett & Griffin, 187 Middle Street, Portland, are architects.

SOUTH ATLANTIC

Gulf Fertilizer Co., Thirty-sixth Street, Tampa, Fla., has plans for new branch plant at Port Everglades, Fla., with storage and shipping facilities. Cost about $65,000 with equipment.

Tampa Shipbuilding & Engineering Co., Tampa, Fla., has arranged for loan of $500,000, of which $300,000 will be secured through RFC, proceeds to be used for purchases of materials and equipment, and construction of four steel diesel engine-propelled cargo vessels for Maritime Commission, Washington.

Skyland Packing Co., Hendersonville, N. C., recently organized, care of H. G. Carlisle, Hendersonville, plans new one-story food canning and packing plant. Cost about $45,000 with equipment.

WESTERN PA. DIST.

Westinghouse Electric & Mfg. Co., East Pittsburgh, has asked bids on general contract for two additions to branch works at East Springfield, Mass., two stories, 232 x 382 ft., for storage and distribution, and one-story, 170 x 942 ft., for general manufacture, to cost $207,000 and $245,000, respectively. Company also will make alterations and improvements in building B at same plant and will build a new conveyor bridge. Prack & Prack, 119 Federal Street, Pittsburgh, are architects.

Kanawha County Board of Education, Charleston, W. Va., plans manual training department in new one and two-story junior high school at Kanawha City, W. Va., where tract has been acquired. Cost over $250,000 with equipment. Warne-Tucker-Silling, Masonic Temple Building, Charleston, are architects.

MICHIGAN DISTRICT

Goosmann Mfg. Co., Grand Rapids, Mich., manufacturer of toys, games, etc., has acquired two-story building, formerly used by Peterson Brewing Co., and will remodel for new plant for increase in capacity. Cost over $40,000.

Ethyl-Dow Chemical Co., Midland, Mich., has let general contract to Austin Co., Cleveland, for addition to branch plant at Wilmington, N. C., used for extraction and processing of bromine from raw sea water. Cost over $1,000,000 with equipment.

Quality Beverage Co., Muskegon, Mich., plans new one-story mechanical-bottling plant. Cost close to $45,000 with equipment.

OHIO AND INDIANA

City Council, Sandusky, Ohio, has authorized plans for new municipal electric power plant. Cost about $1,500,000. Financing is being arranged through Federal aid. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

Ready Foods, Inc., 3800 West Thirty-eighth Street, Chicago, meat packer, has leased a one-story building on Lisbon Road, Cleveland, and will remodel for new branch plant. Cost close to $40,000 with equipment.

Antonio Palazzolo & Co., 712 Central Avenue, Cincinnati, manufacturers of food products, have let general contract to Frank Messer & Sons, Inc., 2215 Burnet Avenue, for new six-story and basement plant, 100 x 100 ft., at 2009 Gilbert Avenue. Part of structure will be used for processing and packing, with another section for storage and distribution. Cost about $125,000 with equipment. Carlton, Frankenberger & Batson, 4122 Davis Lane, are architects; O. W. Motz, 920 East McMillan Street, is mechanical engineer.

Contracting Officer, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until May 9 for 4000 flexible instrument connection assemblies (Circular 917), 8250 adjustable jaw wrenches and 391 adjustable pipe wrenches (Circular 919); until May 10, one electric motor-driven pedestal-type buffer and polisher, and one electric motor-driven bench-type buffer (Circular 922), 2000 lamp instruments with sleeve and 400 compass lamp assemblies (Circular 908); until May 11, 2100

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conduit clamps, 4200 flexible conduit end ferrules, 2100 conduit nuts and 2100 flexible conduit nuts (Circular 914); until May 12, brass wire cloth and bronze wire cloth (Circular 913).

Board of School Trustees, Evansville, Ind., has let general contract to Anderson & Veatch, 225 S.E. Eighth Street, for one-story equipment maintenance and repair shop, 117 x 138 ft. Cost over $75,000 with equipment. Fowler & Legeman, Central Union Bank Building, are architects.

SOUTHWEST

Gast Bottling Corp., 851 Hornsby Street, St. Louis, has asked bids on general contract for new one-story mechanical-bottling plant, 65 x 115 ft., on adjoining site. Cost close to $70,000 with equipment. Leonhard Haeger, 3844 Utah Place, is architect.

Grand River Dam Authority, Vinita, Okla., asks bids until June 3 for following equipment for new hydroelectric generating plant on Grand River, near Pensacola, Okla.: four 20,000-hp. hydraulic turbines, with governors, valves, etc., and one 750-hp. hydraulic turbine, with governor and valves (Contract 5); four 16,000-kva. vertical generator units with accessories, and one 625-kva. horizontal generator, for connection with hydraulic turbines noted (Contract 6); also for construction of power dam and power station, including radial gates, penstocks, electric hoists, cranes, piping, valves and other equipment (Contract 7). Project will cost about $20,000,000. Financing has been arranged through Federal aid. Holway & Neuffer, 2302 East Eighteenth Street, Tulsa, Okla., are consulting engineers.

G. & J. Mfg. Co., Dallas, Tex., manufacturer of canning and packing machinery and parts, has begun superstructure for one-story plant at 3914 Willow Street, with division for production of air-conditioning machinery and parts. Cost about $100,000 with equipment.

SOUTH CENTRAL

Liquid Carbonic Co., 3100 South Kedzie Avenue, Chicago, manufacturer of bottling and brewing equipment, etc., has approved plans for new branch plant at Memphis, Tenn., for production of dry ice (carbon dioxide). Cost over $125,000 with equipment.

Welding Gas Products Co., 1042 East Sixteenth Street, Chattanooga, Tenn., recently organized to manufacture industrial oxygen, hydrogen and other gases, has acquired building at 821 East Eleventh Street and will remodel for plant. Cost about $50,000 with equipment. J. D. Williams is vice-president and general manager; E. J. Lowrey is plant manager.

Royal Crown Bottling Co., Inc., Danville, Ky., has let general contract to A. W. Walker, Danville, for new one and two-story mechanical-bottling plant, 42 x 122 ft., and 42 x 42 ft., respectively, latter unit primarily for storage and distribution. Cost over $65,000 with equipment. Frankel & Curtis, McClelland Building, Lexington, Ky., are architects.

United States Engineer Office, Memphis, Tenn., asks bids until May 9 for one electric motor-driven hand planer and jointer (Circular 249).

MIDDLE WEST

Commanding Officer, Ordnance Department, Rock Island Arsenal, Rock Island, Ill., asks bids until May 13 for two horizontal boring mills (Circular 622), one high-speed muffle-type furnace (Circular 619), three 1-ton welding manipulators (Circular 620), one sand-blast cabinet, with sand blast and dust-arrester equipment (Circular 621).

Coca-Cola Bottling Co. of Chicago, Inc., 1101 West Congress Street, Chicago, has asked bids on general contract for three-story mechanical-bottling plant at State and Seventy-third Streets. A one-story repair and garage building for company motor trucks and cars will be erected on adjoining site, with facilities for handling about 100 cars. Cost about $250,000 with equipment. Shaw, Naess & Murphy, 80 East Jackson Boulevard, are architects.

Village Council, Westbrook, Minn., asks bids until May 9 for diesel engine-generator units and accessories, exciters, switchboard, oil tank and auxiliary equipment for new municipal electric power plant; also for an electrical distributing system. Buell & Winter Engineering Co., Insurance Exchange Building, Sioux City, Iowa, is consulting engineer.

United States Engineer Office, Fort Peck, Mont., asks bids until May 10 for 41,000 lin. ft. of wire rope (Circular 261).

Compressed Industrial Gases, Inc., 221 North La Salle Street, Chicago, manufacturer of industrial oxygen, acetylene and other gases, has let general contract to F. R. Heavner, Montgomery Trust Arcade, Norristown, Pa., for one-story branch plant near Conshohocken, Pa. Cost over $150,000 with equipment.

Board of Public Works, Alexandria, Minn., asks bids until May 9 for deep-well pumping machinery and auxiliary equipment for municipal water system. Burlingame, Hitchcock & Estabrook, Inc., Minneapolis, is consulting engineer.

Quartermaster, Fort F. E. Warren, Wyo., asks bids until May 19 for nails, hacksaw blades, pipe fittings, hardware, and other equipment (Circular 749-49).

PACIFIC COAST

Ventura Citrus Association, Ventura, Cal., has let general contract to E. J. Durkan, East Telegraph Road, Santa Paula, Cal., for one-story and basement addition to fruit-packing plant, 131 x 169 ft. An air-conditioning system will be installed. Cost about $80,000 with conveying and other mechanical-handling equipment. W. W. Ache, 301 North Citrus Avenue, Los Angeles, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 17 for four heat-treating, box-type electric furnaces, with spare parts (Schedule 3377), one forging steam hammer (Schedule 3415) for Mare Island Navy Yard; 308,000 lin. ft. of steel cable (Schedule 3411) for San Diego Naval Air Station.

Bureau of Reclamation, Denver, asks bids until May 16 for seven transmitter mechanisms for remote water-level indicators, and four mechanisms for gate-hoist floating control switches for installation at Imperial dam and desilting works, All-American Canal system, Boulder Canyon project, and gravity main canal, Gila project, Ariz. (Specifications 1064-D).

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Name: Frank J. Oliver, M. E. (Stevens, '21).

A wizard at math, he burned out three slide rules a week in school before he developed a water-cooled slipstick by hooking it up to an ice bag.

Fond of: Mountain climbing. You don't make Tau Beta Pi by becoming expert at such a gregarious game as Kelly pool. No golf, no bridge, no bingo or other civilized diversions—nothing but mountains—days on end.

Works as hard every day as if he were leaving on a week's trip tomorrow—quiet, diffident—but mention mountains and the calves of his legs and his mustache begin to twitch violently. If you have only two hours to catch a train, you won't.

Past: Candy machinery builder, then GE, SKF, *American Machinist,* University of Detroit as industrial co-ordinator, IA Detroit editor.

Married? Yes—and three little hill climbers.

Crush

SOME months ago a small Georgia manufacturer of plows joined the one, big, fairly happy family of Iron Age readers. We wrote him recently, timidly suggesting payment to make it legal, and he answers:

> *"When a man has not got any money he has not got it. BUT LISTEN you big million airs do love to crush a small man. I have never delt with one yet That will not do all in his power to crush the small man.*

Ho hum. Now off to the automat to knock down a couple of cripples who block our way to the sandwich slots.

Trick

FRANK JURASCHEK, our power transmission and material handling editor, wowed us with this:

> *Take a number—any number—say 46579. Total the digits—31. Subtract that from the original number, leaving 46548. Then cross out any digit, and total the remaining digits. Say 6 is crossed out. The remaining digits total 21. Add the 2 and 1, getting 3, and subtract that from 9, leaving 6, which is the digit that was crossed out.*

Be a social success. You don't need to know the original number. Just ask for the sum of the remaining digits. Add 'em together and subtract from 9, and you can always tell which digit was crossed out, provided your friends can add and subtract, and provided the digit crossed out isn't a 9.

Good Heads

SNAP! Down 96% Come Costs of Reaming Hard Aluminum—Cleveland Twist Drill Co.

14 hours a day for 4 years . . . without lubricating—New Departure.

Inconstant Love

AS our hair thins, our liking for compliments in full color diminishes—not that they aren't welcome, but because we have observed that people who praise fluently and without restraint are so often creatures of unstable affection. Six months later you find them lighting someone else's life.

Like those high-watt bulbs used in taking indoor snapshots, the effect is brilliant while it lasts, but the life expectancy is that of a gnat. So we are beginning to prefer less dazzling approbation, as it seems to last longer. Among the week's 50-watt beams are:

> *"We appreciate the good work The Iron Age is doing."*
> *"I am pleased with your journal."*
> *"I find it to be the most informative of the several trade magazines which I receive."*

True, the last one is a trifle on the strong side, and may offend the Oberleutnant, whose mother was probably frightened by a superlative, but what the hell.

—A.H.D.

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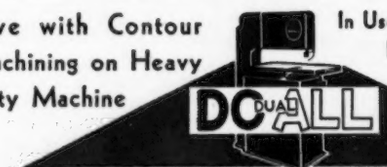

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See our Advt., page 281, Jan. 6th Iron Age.
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21-41 Barclay Street, New Haven, Conn.
Los Angeles: A. C. Behringer, 312 Commercial St., Los Angeles, Cal. San Francisco: Guy Reynolds, 464 Vernon St., Oakland, California.

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